FOUNDRY TRADE JOURNAL

EST. 1902

WITH WHICH IS INCORPORATED THE IRON AND STEEL TRADES JOURNAL

VOL. 101
No. 2083
Registered at the G.P.O. as a Newspaper

SEPTEMBER 13, 1956
Offices: John Adam House, John Adam St., London, W.C.2

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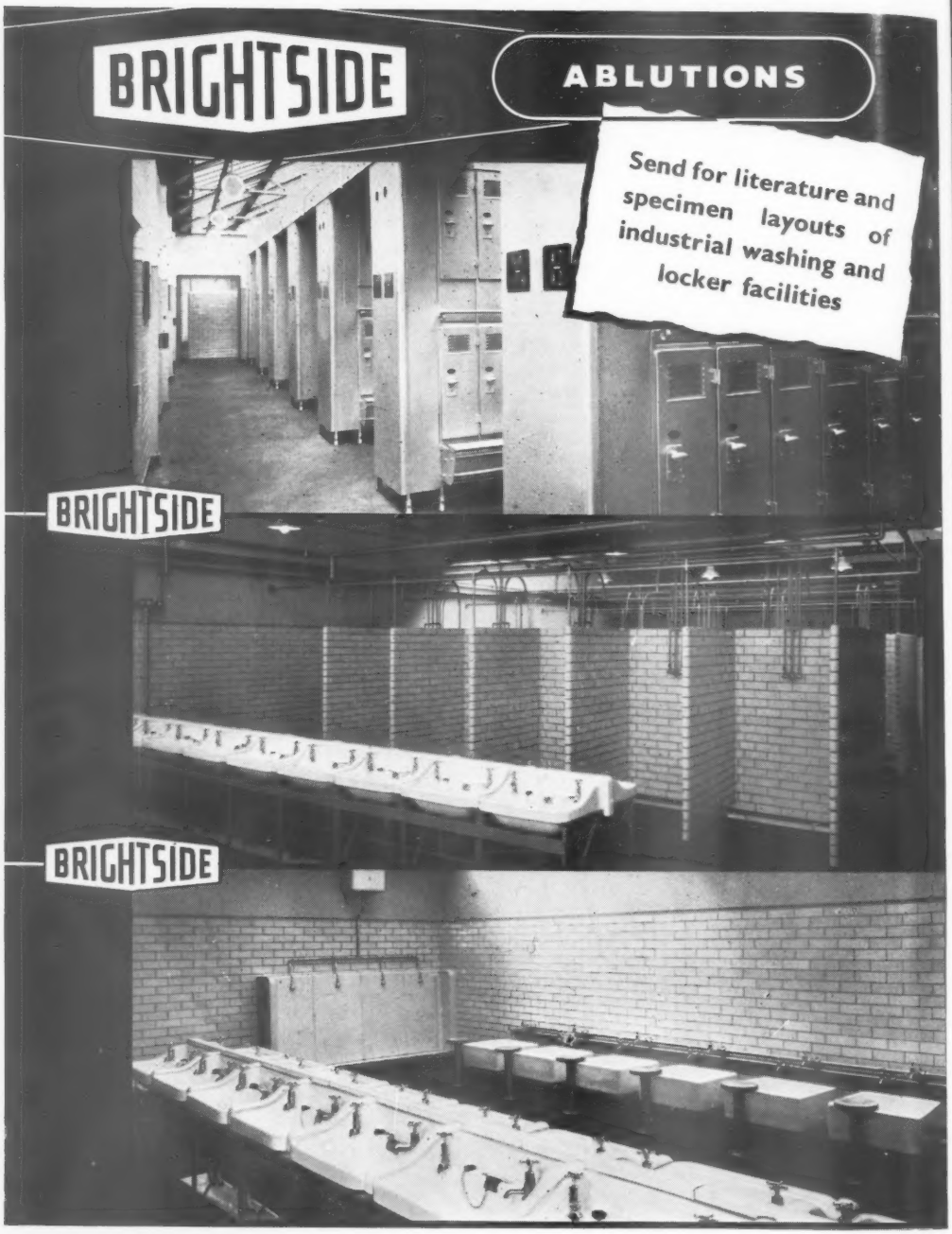

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FOUNDRY TRADE JOURNAL

Established 1902

Vol. 101 Thursday, September 13, 1956 No. 2083

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AN INDUSTRIAL NEWSPAPER PUBLICATION

Published Weekly

Single copy 9d.; by post 1s.
Annual subscription : home 40s., abroad 45s. (prepaid).

17.19 JOHN ADAM STREET, ADELPHI, LONDON, W.C.2

'Phone: TRAfalgar 6171 (10 lines)
'Grams: Zacatecas, Rand, London.

Automation and Readaptation

There is on our desk, a special number of the *Bulletin* of the European Community for coal and steel covering "Readaptation—A New Word for a New Concept," the "concept"—that of rationalization—is not new. Readaptation is exactly what it says, namely, doing what is deemed to be necessary to keep the labour, temporarily displaced, fit and well to take their part when the effect of rationalization bears fruit. It is better than the commonly used word "relocation" as it is more comprehensive. Towards the end of an interesting survey of what has and is being done in this matter in France and Italy, attention is drawn in the booklet to "Automation." A definition of this new technology is given as the use of mechanical and electronic devices, rather than workers, to regulate and control the operations of machines. This is as good a definition as we have seen, as it limits the implication to a definite set of conditions in the foundry.

Some of these conditions are applied in the foundry, such as the automatic moulding machine, and, in America, the time and pathway control of the heads of impeller-ramming machines. Neither of these show, or is likely to show, a profound effect on the total labour force; rather do such innovations cut out variables and facilitate control. Time switches on sand mills; automatic weighing or the metering of liquids and even cupola charging machines, largely enter into the same category. The position of the foundry industry must resemble that of the American chemical industry, where from 1947 to 1954 there was a gain of 1.3 per cent. in the productive staff, whilst the output increase was 50 per cent., but for the foundry the starting period would have to date back some 50 years.

Sir Walter Puckey has contributed an article to this *Bulletin*, and he rightly insists that the recent laying-off of men in the motor-car trade is not due to automation but to a lessened demand for the product. The answer to this is for management to do everything possible to provide a better article at a cheaper price so that public demand will necessitate increasing production. Sir Walter points out that automation should be an incentive to recruitment, as for example in coal mining, because men prefer to work with modern equipment using modern methods. Taking the definition cited for automation as being satisfactory, then to our mind it is not of greater significance than mechanization. It is a *sine qua non* that throughout the last five decades this development has raised the standard of living throughout the world. It is only the interim period which introduces the problem of "readaptation" and to our mind this problem is capable of resolution, but remains one which will require the serious attention of Government and industry alike.

CFA Training Conference

Arrangements continue in readiness for the conference on training which the Council of Ironfoundry Associations is organizing in London on Wednesday, November 7, 1956, in the Assembly Hall of the Royal Empire Society, Craven Street, Strand, W.C.2. Under the guidance of the CFA Training and Education Committee and its chairman, Sir Harold West, who will preside, the programme is developing. It has been decided to organize the conference in two "Brains Trust" sessions, one in the morning and one in the afternoon. Each of the two sessions will be introduced by a short paper, after which the "Trust" will deal with questions from the audience. Opening the morning proceedings will be Dr. J. G. Pearce, director of the British Cast Iron Research Association, who will speak on future trends in the industry, the subject then going over to "trust" and the audience. In the afternoon, Dr. A. Ivanoff will introduce a session on supervisory training, after which a similar "trust"/audience interchange will follow.

By the courtesy of the Constitutional Club, it will be possible to provide the gathering with an excellent buffet lunch at the Club premises, which practically adjoin the Assembly Hall. The charge for the luncheon will be included in the conference fee, which is expected to be of the order of £2 2s.

The last CFA Training Conference was held in March, 1952. In the four years and five months that have passed since then, a considerable step forward in the CFA's training and educational activities has taken place, including the enlargement and reconstitution of a committee charged specially with this work, and the appointment of a full-time training officer. In the same period, however, new problems and issues have arisen, and many questions, particularly in the field of management and executive training, have come to the fore.

National Foundry Training Centre

Remaining Terms, 1956

The following are the opening and closing dates and the courses for the two remaining terms of 1956 at the National Foundry Craft Training Centre, West Bromwich:

Term.	*Opening date.*	*Closing Date.*	*Course.*
84	Oct. 2	Nov. 16 ..	2nd
85	Nov. 26	Dec. 21 ..	4th

Applications for places in the first course (Term 84) should be made now to the Centre secretaries, Heathcote and Coleman, 69, Harborne Road, Edgbaston, Birmingham, 15 (telephone: Edgbaston 4141).

Dust from Silica Bricks

An article in *Iron Age*, written by two members of the staff of the Timken Roller Bearing Company—Mr. C. E. Cline and Mr. R. A. Bloom, describes the experiments they have made to eliminate dust when handling silica bricks. The final process evolved was to dip pallet loads of bricks into a solution of 1 lb. of lignosulphate in one gallon of water. During mixing an agitation is used together with an anti-foam agent to reduce the formation of suds. On dipping, the solution penetrates the brick surface and dries rapidly by absorption. The resinous film thus formed binds the loose particles of the brick together. Spraying the solution should be more effective.

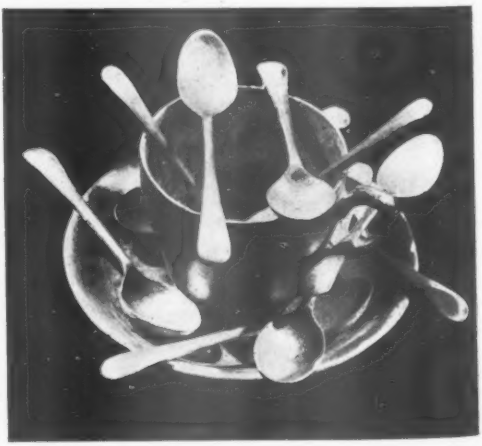
New Australian Foundry

The new foundry of Allied Ironfounders, Limited, which has been installed at Clayton, Victoria, Australia, is said to have cost £A1,500,000. It was formally opened on May 17 by his Excellency, the Governor of Victoria, General Sir Dallas Brookes. He not only tapped the cupola but cast up a mould. Hot-blast cupolas have been installed so as to ensure hot metal using high ash Australian coke. The works, the buildings of which occupy 3½ acres, were started in 1955. Initially, the output of liquid iron is of the order of 5 tons per hour, but this will be stepped up to 10 tons per hour. The works will make all the well-known productions of the company.

Revised British Standard

British Standard No. 1244 for metal sinks for domestic purposes has been revised in order to allow more scope in regard to the choice of bowl sizes and the materials used in their manufacture. The bowl sizes are now based on minimum dimensions, leaving the manufacturer free to offer the particular sizes that are best found to meet the purchaser's requirements. The overall frame sizes have not been changed, so that the interchangeability of units is not affected. The single sink without draining board has been deleted from this edition as it was agreed that there is little call for this type except to meet specialized requirements and because the general aim has been to cover requirements for sinks used for domestic purposes. By arranging that strainer wastes may be fitted if required, greater scope has been given regarding the positioning of wastes and the type of waste used. Sinks made from stainless steel, enamelled pressed steel, and enamelled cast iron are covered, and requirements for resistance of the enamel to abrasion, acids and alkalies are given.

Casting made by Mr. T. Griffin, foundry foreman at Alfred H. Mould & Sons, Limited, Walsall. No cores were used and the green-sand moulding method was practised. The 10 spoons are awkwardly placed, but a satisfactory casting was made using aluminium pattern metal for its production.



Seventh IBF National Works Visits

Lancashire Foundries Open their Doors

For the seventh year in succession the Institute of British Foundrymen has organized a series of works visits open to members throughout the country. On October 12, with the Lancashire branch acting as hosts, ten foundries in the Manchester area will be visited by the various parties. To enable intending participants, as well as readers, to form some idea of the establishments to be seen, brief descriptions are given in what follows. In the accounts the main concern is to record features which will be of particular interest to foundrymen.

Ferranti, Limited

A small foundry was laid down by Dr. Ferranti, founder of Ferranti, Limited, electrical and general engineers, Hollinwood, Lancashire, nearly 60 years ago, so that the quality and dependability of castings used in Ferranti products should be uniform and the same care and attention to design could be maintained through all stages of manufacture. To-day, the foundry at Hollinwood is a highly-mechanized unit with a large proportion of the output in the form of thin-wall, true-to-dimension castings, having an extremely high finish in grey irons of various grades.

A high tonnage of metal melted each week is "Nomag," a high resistance, non-magnetic austenitic cast-iron alloy, introduced in 1923, with specific applications in the electrical industry and used extensively in the firm's own products and in the general electrical industry all over the country. "Nodumag," a ductile iron of similar type to "Nomag," with higher physical properties, together with s.-g. iron are also produced in large and small quantities up to weights of 5 tons. The foundry can, roughly speaking, be divided into three sections.

The first section comprises two completely-mechanized, continuous-casting plants, producing large quantities of small accurate castings with an extremely high standard of finish. The second section comprises the machine moulding of heavier castings (Fig. 1) to an overall box size of 72 by 44 in. with the attendant mould and sand-handling plant, and the third section comprises a jobbing foundry for the manufacture of still larger castings in small quantities up to an overall weight of about 5 tons. This foundry is served by an impeller rammer which again has its own mould and sand-handling plant.

The well-designed stockyards are served by a railway siding so that raw materials can be off loaded by the Semi Goliath 3-ton crane. There are six cupolas installed in a single row. Four of them of 2 ft., one of 33 in. and one of 36 in. internal lined diameters. These furnaces are so arranged that only the spouts project into the foundry, with the object of reducing the amount of heat radiated into the shops.

With the advent of spheroidal-graphite irons, the technique was applied to Nomag with remarkable results, giving vastly increased strength and considerable ductility whilst retaining the non-magnetic properties. Also, production of conventional s.-g. irons in the "as cast," annealed and stress-relieved states was commenced some three-and-a-half years ago and there are indications of increasing interest in this unique material, castings being produced by loose pattern, plate and machine moulding methods for the electrical, agricultural, mining and general engineering industries.

Moulding Plants

Two continuous-casting plants are installed using Osborn jolt/ram and Pneulec Nicholls jolt/squeeze machines for mould manufacture and a pneumatic flat rammer for firming-off backing sand is fitted over the Osborn-type machines. From the machines, the moulds are closed and placed on a pallet conveyor and a spring-loaded clamp (Fig. 2) serves both as a box clamp and weight for the moulds. Sections cast are, in general, so light, that

FIG. 1.—*Moulding boxes carried on a roller conveyor path are rammed-up by pneumatic rammer.* (*Ferranti, Limited.*)

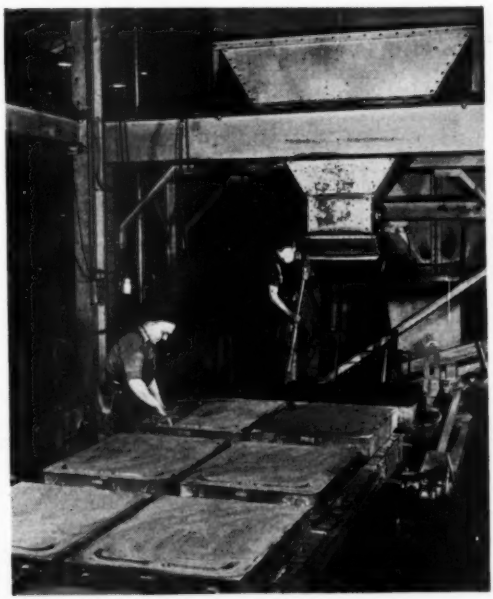


FIG. 2.—*Fixing the Ferranti clamping device prior to casting.*

there is need neither for a fume hood nor for prolonged cooling, and boxes are removed from the conveyor on to a Sterling vibrating grid by a pneumatic thrust. Castings are placed on trays on a pendulum conveyor, with runner and scrap placed in containers of Ferranti design on the same conveyor. Runners and scrap are automatically deposited in bins and the castings are removed by hand and shot-blasted on a Spenstead airless, rotary-table-type machine. After shotblasting, the castings are carried on a rubber belt conveyor to inspection, grinding and fettling, thence to the despatch departments.

Jobbing Bay

The impeller rammer is of the motive type and generally takes care of ramming the heavier type of moulds. Amongst other jobs, moulds for 5 ton castings in "Nomag" are regularly cast in this bay which is served by two overhead-electric cranes, the larger one of 10-ton capacity. Except for a few moulds which, because of their size, are embedded in the floor, these cranes handle all moulding boxes for knock-out into the sand-reconditioning plant.

Machine-moulding Plant

In the continuous bay, a pair of Pneulec Herman machines deal with heavier machine-moulded castings, empty boxes being handled on to the machines by overhead runway, and moulds are cored-up, closed and cast by means of a 3-ton crane. Batch casting is employed, boxes being knocked out on a Sterling shakeout.

Coremaking

Light and medium cores are made in a mechanized section and heavier cores produced beneath the crane track in the jobbing bay. Osborn and Redford core-blowers are in use, and larger cores are made on specially-adapted Osborn and Herman moulding machines. Oil-sand mixtures are prepared in a separate shop where paddle-type mixers are in use. Smaller cores are

FIG. 3.—*General view of the patternshop at Ferranti, Limited.*

carried to spray booths by conveyor for blacking when necessary, and drying is carried out by two Acme continuous stoves.

Patterns

Adjacent to the main building is the wood-pattern store and patternshop (Fig. 3). Here, high quality wooden, loose, and board patterns are produced, also models, prototypes and "mock-ups" are prepared. Extremely accurate metal patterns for use on the continuous plants, reproduced in a separate department of the foundry, are almost exclusively of iron mounted on cast-iron plates, thus giving long-life and maximum "definition" of castings.

Amenities

A considerable number of footbaths and showers and individual washbasins are provided both for men and women employees. A bright and airy canteen is also housed in the amenities block which is well up to the very high standard required by the management.

L. Gardner & Sons, Limited

The company of L. Gardner & Sons, Limited, was founded in 1898, with works at Old Barton Hall, Peel Green, Patricroft, near Manchester, with a modest labour force of 80 men. At that time, the production was mainly small gas engines and the like. In 1908, 1911 and 1912, additional land was acquired and part of the later acquisition was used for the construction of a foundry in order to supply castings for the firm's ever-growing output. The first world war saw the company mainly engaged on munitions and engine production ranging from ½ to

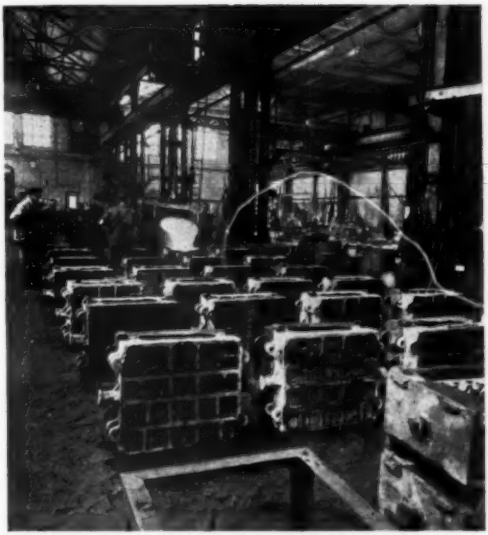


FIG. 4.—*Part of the main bay of the iron foundry at the Barton Hall engine works of L. Gardner & Sons, Limited, showing a group of medium-size moulds arranged for pouring through the side.*

FIG. 5.—*General view of the aluminium die-casting foundry of L. Gardner & Sons, Limited. Stores for dies and components are shown in the background.*

200 h.p. At the end of the war, personnel had grown to about 1,200. Then came the slump and the total at one time diminished to 420. This difficult period was devoted to research, and the development of compression ignition engines and the four types made proved to be an outstanding success and from 1928 onwards their production was gradually increasing. By 1939, when some 2,000 workpeople were employed, the demand for the Gardner engine was firmly established and being of vital importance to the war effort, the output of the works was not substantially changed.

The firm now operates four foundries—two for iron—the larger one, built in 1912, occupies 21,000 sq. ft. and a smaller one, built in 1920, covers an area of 7,400 sq. ft. There are also two non-ferrous foundries having together an area of 25,200 sq. ft. The iron foundries (Fig. 4) employ some 258 people and melt some 250 tons of metal a month using two 5-ton and two 2-ton per hour cupolas. There is installed a semi-mechanized plant capable of handling castings up to 4 cwt., but the jobbing floors tackle jobs up to 3 tons. The non-ferrous foundries (Fig. 5), which employ 167 people, make about 7 tons per month of copper-based castings and 100 tons of aluminium castings. For melting light alloys, there are six oil-fired tilting furnaces and for the copper-base alloys, six coke-fired pit furnaces. Moulding is vertically effected by 20 jolt pin-lift machines. For coremaking, both vertical and horizontal coreblowers are in regular use. For fettling, there are shotblast cabinets, band saws and all the usual equipment necessary for the finishing of castings. Also, there are heat-treatment and gravity-die-casting departments. Most of the castings made are absorbed in the firm's own works which to-day employs some 2,500 people. From the cast-iron foundry come large quantities of cylinder blocks and heads, whilst both the aluminium and the cast-iron foundries make the crankcases.

Confidence in the future of cast iron is shown by the project to build an extension to the foundry which is to occupy about 23,000 sq. ft.

Mather & Platt, Limited

The works of Mather & Platt, Limited, were previously visited by members of the Institute of British Foundrymen and others attending the International Foundry Congress held in June, 1955, and a more detailed account of the company was given in the special issue of the JOURNAL published on June 11, 1955. Members have again been invited to visit the company, which manufactures a wide

FIG. 6.—*View of the moulding-machine bay at Mather & Platt, Limited.*

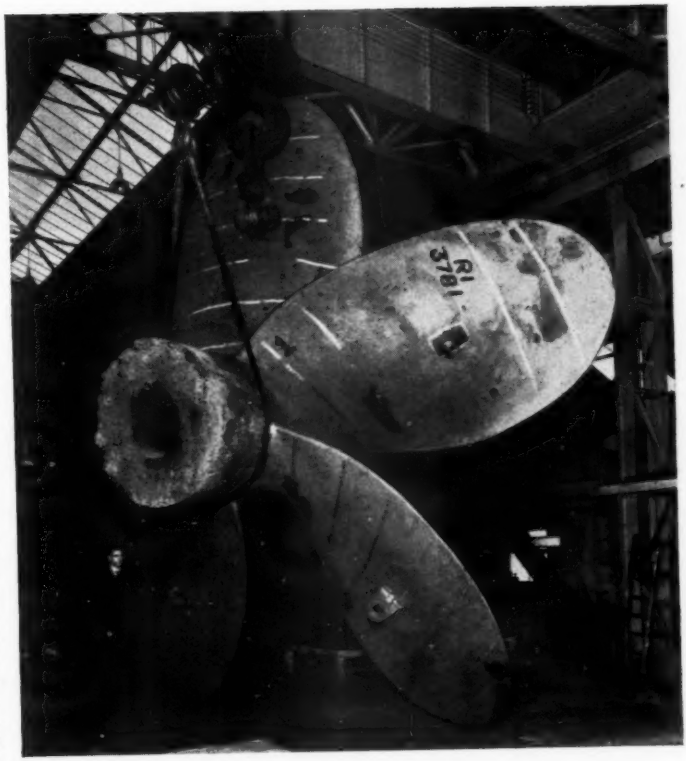


FIG. 7.—*Five-bladed Scimitar propeller in Nikalium produced by the Mangenese Bronze & Brass Company, Limited.*

variety of products including centrifugal pumps, electric motors and generators, textile-finishing machinery, fire-protection equipment, fire resisting doors and rolling shutters.

Plant and Equipment

The foundry, which employs approximately 180 workpeople, is mainly concerned with work of a jobbing nature and turns out about 70 tons of grey-iron castings per week which may vary in weight from a few ounces to about 20 tons. It is divided into three main bays, each 50-ft. wide and 450-ft long and with the exception of the floor-moulding space, is concrete floored. Six pits of depths between 4 and 12 ft. and up to 12-ft. square are used in the handling of castings for the larger pumps and textile bowls. Amongst the lifting tackle employed are one 30-ton, two 20-ton and six 10-ton cranes with two additional low-level cranes serving the moulding machines. A number of 1-ton jibs are situated about the foundry and there are three 2-ton jibs over the larger pits for coring-up and pattern-drawing. A monorail telpher is used for cupola charging and an electro-magnet for handling scrap, part of which is broken up at the rear of the foundry, using a scotch derrick and tup. Two sandhandling and processing plants are in operation; an August's plant providing facing-sand and, in addition, backing-sand for feeding the large boxes and the Sandslinger which has a sand capacity of approximately 4 cub. ft. per min. and a working radius of 17½ ft. The moulding machine section (Fig. 6) contains 13 roll-over/jolt-squeeze machines and moulding boxes from 14 in. up to 14-ft. sq. can be accommodated. Elsewhere, rectangular floor-moulding boxes up to 15 ft. long are used. Large cores are made by men coremakers at the top of the main shop where there are seven coke-fired stoves 12-ft. high and 26-ft. deep and of varying widths, whilst the smaller cores are made by women in an air-conditioned coreshop. There are two shot-blasting cabinets in the dressing shop, each with a capacity of about 1,700 cub. ft. employing air at 100 lb. per sq. in. A 30-cwt. Wheelabrator deals with the smaller castings and both pneumatic and hand chisels are used. All patterns used in the foundry are made in the firm's pattern-shop and there is ample storage space alongside the foundry. An adjacent building contains showers, wash places and canteen for the foundry employees.

Manganese Bronze & Brass Company, Limited

The business was founded about 70 years ago and its first premises were on the south side of the Thames in Deptford. The products of the company then consisted of a variety of non-ferrous work, including rolled sheets, tubes and bars, forgings and castings, propellers and propeller blades. With increasing business, these premises proved inadequate and about 1907, the propeller-manufacturing section was transferred to a new site on the opposite side of the River Thames at Millwall, and in 1916, the rolling-mill section was transferred to a new works at Ipswich. The founder of the business was Mr. M. Parsons, the inventor and patentee of the original Parsons manganese bronze, and the company claims to be the pioneer and original manufacturer of the now universally-used, manganese-bronze propeller.

The propeller works at Millwall continued to develop until 1940 when it fell an early victim to the German blitz and a new site was sought in the North West. Because of the emergency it was not

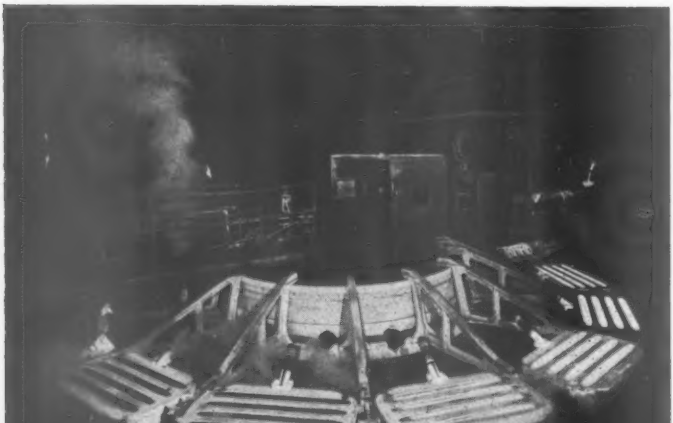


FIG. 8.—*Casting wheel for wire bars at the copper-refinery wire mill division at the Prescot works of British Insulated Callender's Cables, Limited.*

possible to build an entirely new factory and an existing works at Dock Road, Birkenhead, was taken over, which has since been developed and extended to its present site. The built-up area of the works is now roughly 11 acres and there is considerably more space for future development. This works employs about 450 persons and its products are almost entirely marine propellers ranging from the small but exact models used for tank-testing purposes up to giants of 30 tons or more (Fig. 7). Between these limits propellers are designed and manufactured in an infinitely wide variety of shapes and sizes, being intended for all classes of vessels from high-powered naval patrol boats to slow ocean-going tramp ships, the whole process being covered, from the manufacture of the alloy from virgin metals to the final polishing of the complete propeller. Roughly two-thirds of the propeller output tonnage is supplied in manganese bronze and one-third in "Nikalium," a special nickel/aluminium-bronze alloy which has been developed over the past ten years or so. A few further items, such as special non-ferrous ingots, large castings and turbine runners for hydro-electric plants, are made, but there are relatively few by comparison, although the latter are most interesting components from the manufacturing angle.

FIG. 9.—*Bank of medium-fine wire-drawing machines. (Prescot works. British Insulated Callender's Cables, Limited.)*

The works comprise three main sections: foundries, machine shops and finishing shops, which are laid out primarily to handle the heavy castings involved, all being fitted with heavy cranes of 30 to 45 tons capacity.

The foundries use the Randupson sand-cement moulding method and metal is melted in a number of oil-fired tilting and reverberatory furnaces, the largest being of 25 tons capacity. A 350-kw. Ajax-Wyatt lip axis tilting furnace of the 2-channel type was also installed in 1954, and is capable of melting and pouring 21 tons of manganese bronze. Whilst the electrical rating is relatively low, this furnace is believed to be the largest of its type in this country.

In the machine shops, boring machines and blade planing machines are provided for machining the propeller castings, the industry being one in which the traditional craftsman's skill is still the main factor.

There is a well-equipped laboratory which exercises control over works processes and also carries out research on the various aspects of propeller materials, an important one being resistance to corrosion fatigue.

The company has works at Ipswich, the "Handford" works, where rolled and extruded products are manufactured, and this has undergone considerable development, and a separate branch was opened at Elton Park about five years ago, which handles sintered products, in particular the "Oilite" self-lubricating bearing.

British Insulated Callender's Cables, Limited

Prescot Works

British Insulated Callender's Cables, Limited, is claimed to be the largest organization in the world with complete facilities for research, manufacture and contracting in the transmission and distribution of electrical energy for power purposes. It was formed in 1945, through the merging of two famous electrical-engineering firms—British Insulated Cables and Callender's Cable & Construction Company—both of which had their origins in the pioneering era following the introduction of the incandescent electric lamp.

The company has four large main factories (at Erith, Helsby, Leigh (Lancs) and Prescot), many smaller works and its own copper refinery. Although the chief products are, of course, electric cables of every kind, the company's production facilities enable it to offer a large range of other products, mostly in the realm of electrical transmission and distribution.

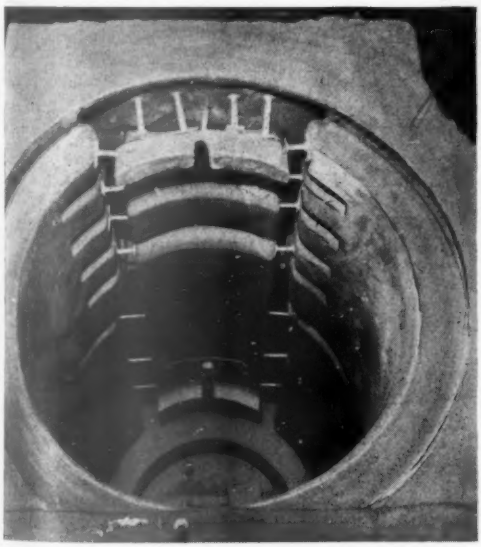
The origin of the Prescot works dates back to 1891, when the British Insulated Wire Company commenced activities on the site. The subsequent history has been one of continued steady expansion and to-day the works cover an area of some 180 acres, and employment is provided for more than 7,000 persons. Most of the metallurgical activities of BICC are located at Prescot, where operations include the refining and casting of copper and copper alloys into wire bars and other shapes (Fig. 8), and the rolling, drawing and extrusion of copper and aluminium into rods, wires, strips, sections and sheets.

In addition to the cables and stranded wires (both aluminium and copper) which are manufactured, there are ferrous and non-ferrous foundries equipped for floor and machine moulding, engaged in the casting of a wide range of fittings required in connection with power-transmission lines, underground-mains cables, electrical-transport schemes, telecommunication systems and other purposes. These fittings include straight joint boxes, service boxes, terminal boxes, link boxes, cut-outs, feeder pillars and other cable accessories, in addition to crane collector and traction equipment including the various types of fittings required for the overhead equipment of railway-electrification schemes.

The wire mill division comprises the copper refinery, rolling mills, wire drawing, stranding and extrusion departments, in addition to the sheet mill.

Copper Refinery

The copper refinery, the furnaces of which are capable of dealing with some 100,000 tons of copper annually, occupies a separate section of the Prescot works. Electrically-operated charging cranes deposit unrefined raw blister copper into furnaces, where the refining processes are carried out to remove any impurities. When refining is completed, the furnaces are tapped and the pure metal cast into the required shapes.



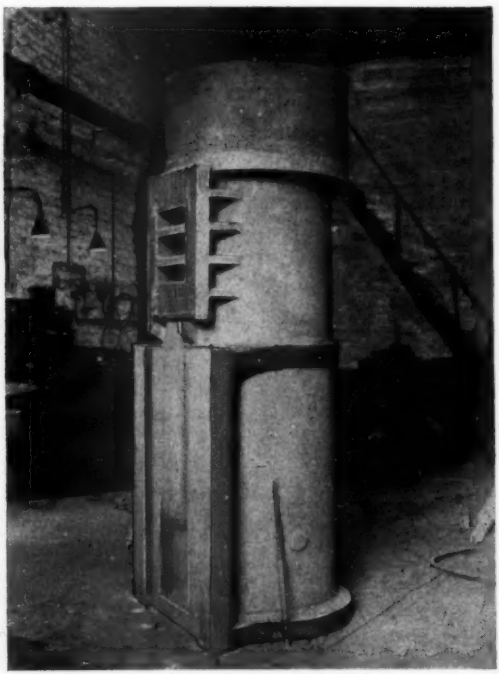


FIG. 10.—*Complete mould for a cylinder ready to receive the main barrel core and, later, the feeding head; (right) finished casting showing the port openings. The feeding head is still attached. (Joseph Berry, Limited.)*

IBF National Works Visits

Casts are usually made direct from the main furnace into copper moulds carried on large rotating wheels, or from smaller holding furnaces filled from the main furnaces. Wheel casting is usually utilized for the production of wire bars, which is the main product of the refinery. Fourteen moulds, each producing four wire bars of approximately 250 lb. in weight, are carried on the casting wheels. Side casting from holding furnaces is used for the production of billets, cakes and other special shapes. The furnaces are transferred by cranes to convenient positions for supplementary heating and treating to obtain the desired quality of metal, after which they are again transferred to stands adjacent to small casting wheels, or to positions where static moulds are located.

Other alloys, principally cadmium copper, are produced in a battery of crucible-melting furnaces, the alloys being transferred direct therefrom into water-cooled moulds conveniently placed. The manufacture and maintenance of copper moulds form an important activity of the refinery which ensures the production of cast copper products having smooth surfaces, possessing good internal structures free from porosity.

Rolling Mills

Here, the 250-lb. copper-wire-bars from the refinery are heated and rolled through a series of passes, resulting in coils of rod, usually about ½-in. dia. The whole operation is performed in one heat and takes about one minute, the rods being coiled on automatic or semi-automatic winders.

At this stage, the product is known as black rod, which is then pickled to remove rolling-mill scale and, after washing, is passed to the heavy wire-drawing department (Fig. 9) where it is drawn to size on automatic machines. Leaving the automatics, the wire is annealed, a process that is carried out in furnaces from which air is excluded. Wire to be reduced to smaller sizes—some as fine as 0.001 in.—is drawn down through diamond dies. There is, in the wire mill division, a diamond die-making plant equipped with the most modern machines.

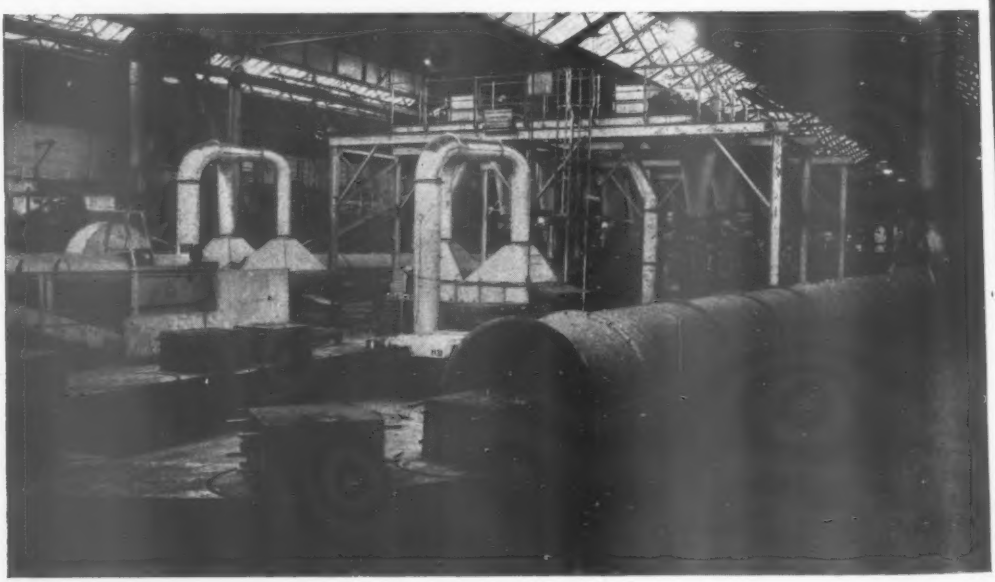
Strips and sections are produced in the extrusion department, which is equipped with powerful hydraulic presses, and a separate department is devoted to the production of copper and aluminium sheets.

BICC operates a variety of trade apprenticeships. Applications are received from personnel already in the works and from those who have had further full-time technical education. Graduate apprenticeships are also planned for those who have completed University degree courses. There is a day continuation school on the works site controlled by the Lancashire Education Authority, and leave of absence is granted to students of required standard to continue their studies in outside technical colleges.

Amenities

Amongst the amenities provided for the staff are an athletic and social club, which covers a very wide variety of sporting, social and recreational activities. Canteen facilities are also provided in all the company's main establishments. Fully-equipped medical

FIG. 11.—*General view of the chair plant at Horwich showing the extractor hood arranged over the mould conveyor.*



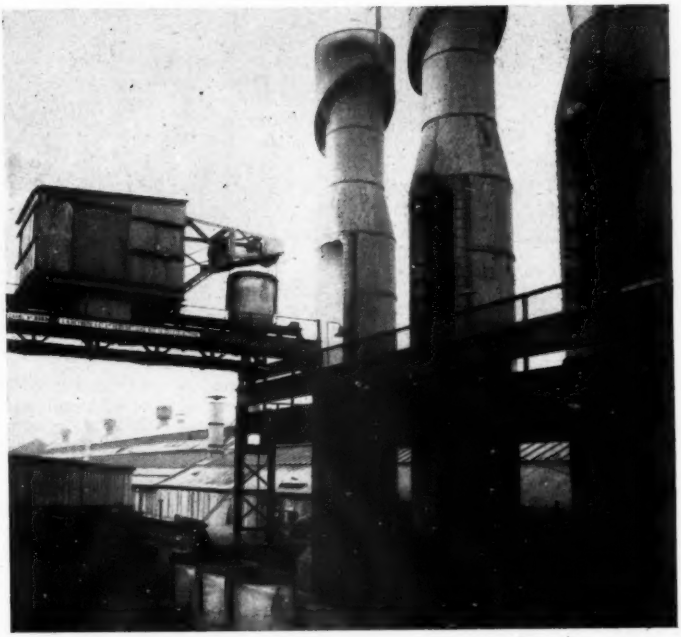


FIG. 12.—*View of the 6-ton charger crane for the 20-ton cupola plant. Note the employment of a snout crane mounted on a travelling bridge crane. (Horwich Locomotive Works.)*

and dental surgeries provide treatment in working hours under the terms of the National Health Scheme. National Savings Groups, Hospital and Benevolent Funds and a free library are amongst the other amenities provided for the employees.

Joseph Berry, Limited

Joseph Berry, Limited, was founded in the year 1865 essentially as a foundry for the production of general-engineering castings of a small and medium nature, its moulding, core-making, and dressing area in those days being in the order of 4,500 sq. ft.

The business was carried on by the founder and his sons, making progressive extensions, until 1929, when it was taken over by B. & S. Massey, Limited, Manchester, for the production of castings required in the manufacture of forging and drop-forging hammers, presses and forging presses, the castings of which are playing their part in the forges of nearly every country in the world.

It is essentially a "jobbing" foundry with no specialization, making heavy and light section castings by the loose-pattern method, which are cleaned by the Hydroblast process. The working area to-day is 28,000 sq. ft. and the chief products are power-hammer cylinders (Fig. 10) up to 12 tons in weight and anvil blocks up to 30 tons in weight, heavy machine-tool beds and columns and diesel oil-engine cylinder housings.

Melting of all metal is carried out by the orthodox cupolas of various capacities.

Horwich Locomotive Works

The Horwich Locomotive Works forms part of British Railways Midland Region workshops. The works, built in 1886, was the main locomotive works of the old Lancashire and Yorkshire Railway Company. The works to-day covers an area of 116 acres and can build some 25 locomotives and completely overhaul 600 locomotives per year for British Railways. A total staff of 3,350 is employed.

Foundries

There are three foundries—a non-ferrous foundry producing about 10 tons of castings per week with a staff of 20; a jobbing foundry producing about 120 tons of miscellaneous iron castings per week varying from small details to locomotive cylinders and employing 118 people; and a mechanized foundry.

Mechanized Foundry

The mechanized foundry will be of the most interest to visiting foundrymen and details of this are given more fully. This foundry produces cast-iron chairs (Fig. 11) and baseplates, as well as locomotive and carriage and wagon brakeblocks. The annual output, working a double shift, is approximately 90,000 tons per year and has a staff of 500. The mechanized foundry was first brought into operation in 1950 and into full operation, including double shift, during 1952. The foundry and stockyards cover an area of 150,000 sq. ft. The foundry consists of two completely mechanized plants, the larger one being known as the chair plant and the smaller one as the brakeblock plant. A core section serves both plants. The foundry is served with raw materials from a stock gantry 630-ft. long having an 80-ft. span. Three 6-ton magnet cranes operate from this gantry, one of the cranes being fitted with a "grab." The chair plant is served by four 20-ton cupolas and the brakeblock plant by four 8-ton cupolas. Both plants have charging cranes (Fig. 12) using the drop-bottom type of charging skip, all charges being weighed. The production of moulds is by the under-sand frame type of moulding machines, being arranged in pairs on the outside of the mould conveyor; short making-up roller conveyors are provided for the closing of moulds. The sand-renovation plant is a complete circuit from knock-out *via* magnetic separator, rotary screen storage hoppers, continuous sand mills and finally,

FIG. 13.—*General view of the steel foundry of Lancashire Steel Corporation, Limited, showing one of the converters.*

back to the moulding machines. Natural bonded sand is used on both plants. A most interesting feature of the foundry is the fully-automatic knock-out which is of the electric vibrating type. This vibrates the moulds, shakes out the sand and castings and conveys the boxes to the return box conveyor and the castings to the cooling skips. The cooling and dressing arrangements follow the same continuous pattern as the rest of the foundry. The castings are conveyed from the knock-out by hot casting conveyor into skips which are attached to a pendulum-type conveyor which runs outside the foundry for the necessary cooling time and returns the castings to the foundry for unloading and, finally, shotblasting and fettling, which is carried out between two moving conveyors and then on to the despatch section.

Other Departments

The core section is fully mechanized and has a small sand-preparation plant which includes drying.

FIG. 14.—*Cast-steel wind-belt weighing 4 tons for the Bessemer plant at Corby steelworks. (Lancashire Steel Corporation, Limited.)*

The production of cores is by machines. It is of interest to note that up to 250,000 cores have been produced in a seven-day week. A considerable amount of equipment has been installed for dust and fume extraction, together with a novel feature of washing the castings during the cooling cycle.

All-metal patterns and coreboxes are used and these are produced in the patternshop which is part of the works organization. A small staff of pattern fitters is employed in the foundry for maintenance purposes. Attached to the foundry is an amenity block containing washing facilities, locker room and shower baths of the modern type, having heating and air-conditioning plant installed.

Lancashire Steel Corporation, Limited

The Irlam Steel Works of the Lancashire Steel Corporation, Limited, originally built by the Partington Steel & Iron Company, Limited, in 1912, are situated on the Northern bank of the Manchester Ship Canal at a distance of about 10 miles from Manchester. The works cover an area of approximately 210 acres and consist of the following departments:—coke ovens and by-products plant; wharf and ore-handling plant; blast furnaces; steel plant; soaking pits; rolling mills, including rod mill and finishing department; foundry and slag and tar Macadam plant. The total number of men employed is approximately 4,000.

The Lancashire Steel Corporation, Limited, was formed in 1930—the nucleus of the Corporation being:—Partington Steel & Iron Company, Limited; Pearson & Knowles Coal & Iron Company, Limited; Rylands Brothers, Limited, and Wigan Coal & Iron Company, Limited. An extensive development scheme was carried out at the Irlam works soon after the formation of the Corporation and a further scheme is now in progress which will add considerably to the productive capacity of the works which, in turn, will increase the output of the entire Corporation.

The foundry covers an area of 62,850 sq. ft. comprising the steel foundry (Fig. 13), iron foundry, brass foundry and dressing shop and employs a total of 150 men, including 79 skilled and 71 semi- or unskilled. The patternshop and store, covering an area of 10,800 sq. ft., is equipped with modern woodworking plant to cope with all patternmaking requirements.

Production

The metals produced per month include 750 tons of iron; 65 tons of steel and 10 tons of copper and

FIG. 15.—*Preparation of the mould for a 17½-ton bottom shell of a crusher frame recently made by the David Brown Jackson Division.*

copper-base alloys. The production consists of hematite ingot moulds, slag ladles, car stools for the steel plant, hematite iron castings, copper collars, tuyeres and Pee Pees for the blast-furnace plant. Additionally grey-iron, carbon steel, manganese steel, phosphor bronze and gunmetal castings are made for general engineering purposes. Thus, this department is considered a general jobbing foundry with weight ranges from ½ lb. to 8 tons in iron; 7 lb. to 6 tons in steel; and 2 lb. to 7½ cwt. in non-ferrous metals.

Plant

The chief items of plant include an August sand-preparation plant, milling approximately 26 tons of sand per day; and for melting, one 42-in. dia. and one 45-in. dia. cupola of 6 tons and 7 tons per hour capacity respectively. For steel melting, there are two 2-ton and one 3-ton capacity Tropenas-type converters. Any steel castings weighing over 3 tons each (Fig. 14) are poured at the open-hearth plant. In the non-ferrous department, there are two rotary oil-fired furnaces, one of 350-lb. and one of 700-lb. capacity. Also there is a 700-lb. capacity crucible coke-fired furnace. Two large gas-fired annealing ovens and a new shotblast plant have recently been installed and all fettling is carried out by the use of pneumatic chipping hammers.

FIG. 16.—*Preparing cores for three castings to form the stone crusher frame for the stone crusher pictured in* FIG. 15. (*David Brown Jackson Division.*)

Apprentice Scheme

All apprentices, fifteen in number, are taken care of under the Apprentice Training Scheme under the personal supervision of a fully-experienced apprentice master. This includes a full practical training in all branches of foundrywork and a sound technical training at the Openshaw Technical College. In addition, the boys are released from work to attend the works training classes with a view to helping them to adapt themselves to industrial life. Instruction includes, among other subjects, works safety, first aid, physical fitness and knowledge of the works—its products and processes. Throughout the period of training, records of progress are kept and reviewed for suitable awards at the annual prizegiving. Apprentices are also encouraged to make full use of the technical library established in the works.

Employees' Amenities

In common with the employees in other departments, the foundry employees enjoy all the amenities of the Irlam Works Recreation Club which cover football, cricket, tennis, bowls, fishing, in addition to all the usual indoor sports. The amenities also include a new mess room, wash room, heated locker room and shower baths installed to comply with the Iron and Steel Foundries Regulations, 1953.

David Brown Industries, Limited Jackson Division

Founded in 1840, the company now known as the David Brown Jackson Division established an early reputation as pioneers in foundry and engineering techniques. Specializing initially in the manufacture of tyre rolling mills, the company quickly evolved a new method of producing steel tyres to precise dimensions. In 1846, the founder, Mr. P. R.

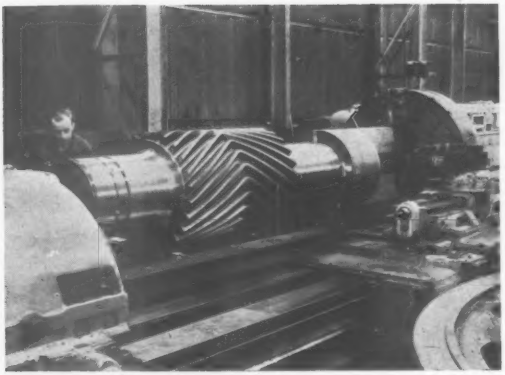


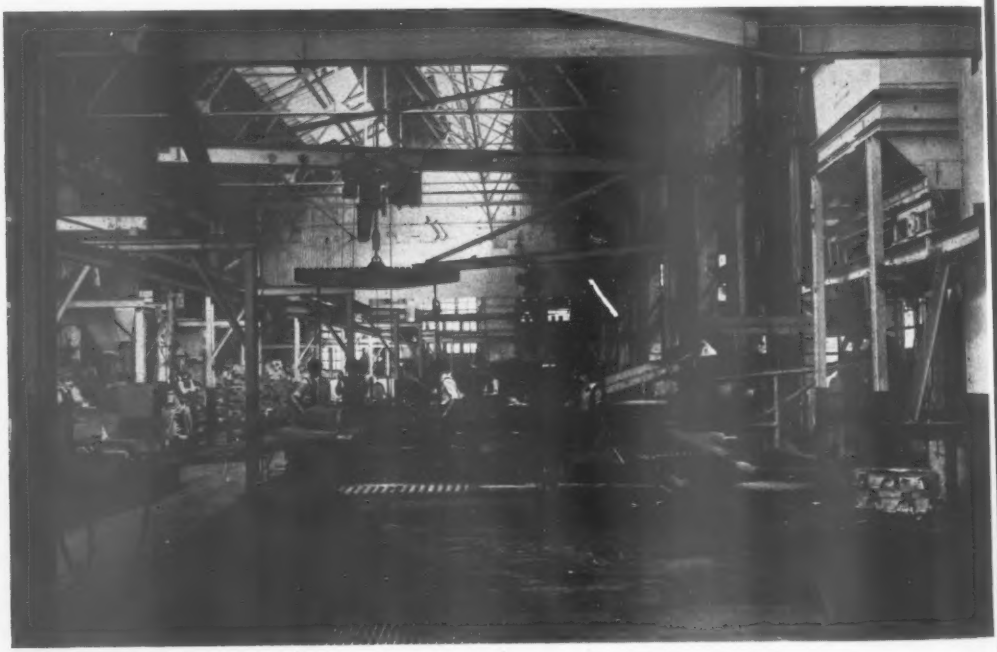
FIG. 17.—*Two forged-steel double helical mill pinions recently cut at the Salford works of David Brown Jackson Division for a rolling mill in Canada.*

Jackson, and his team of technicians introduced and patented the method of moulding gear teeth by machinery, thereby ensuring accuracy of pitch whilst obviating the need for full patterns. Even to-day, this is regarded as the most satisfactory method for producing gears of this type and the company is still one of the leading suppliers. This two-fold interest in steel founding and engineering is reflected in the present set-up of the company which employs approximately 600 people.

Foundries and Plant

The foundries use exclusively acid open-hearth steel produced from two furnaces of 25 and 12 tons capacity respectively. Carbon and alloy steel castings up to 40 tons cast weight are produced. The latest developments in foundry technique are incorporated in the plant, where castings weighing up to 20 tons are regularly produced (see Figs. 15 and 16). General jobbing work is undertaken, but the company specializes in wheels and tyres for the cement industry and in the production of heavy, high-quality gears for the sugar, textile and rubber industries, also in mine winders of all descriptions. The plant includes well-equipped medium and heavy machine shops able to handle all gear-manufacturing demands up to the largest sizes, in addition to equipment for machining gear cases, roll-pinion housings (Fig. 17) and general castings. One of the features of the company's recent development has been the acquisition of new equipment which has enabled them to meet the urgent need for large gears and pinions produced by the hobbing process. This method, which gives even the largest gears the smoothness and efficiency normally associated with precision machinery, is a com-

FIG. 18.—*General view of the non-ferrous foundry showing the mechanized section.* (*Metropolitan-Vickers Electrical Company, Limited.*)



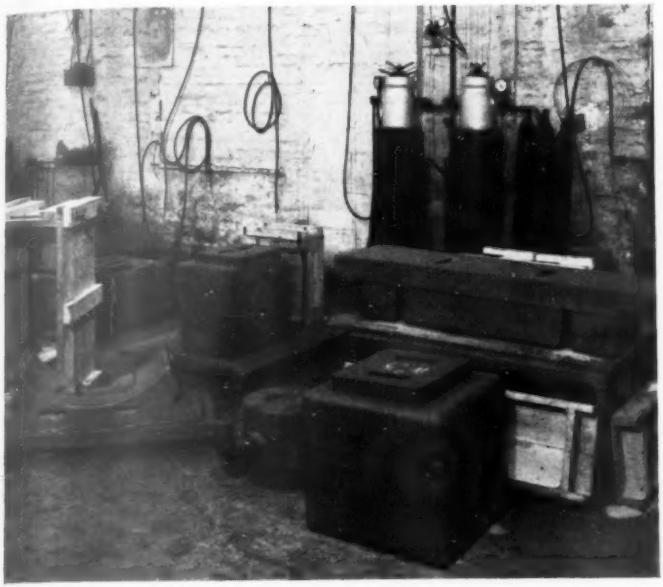


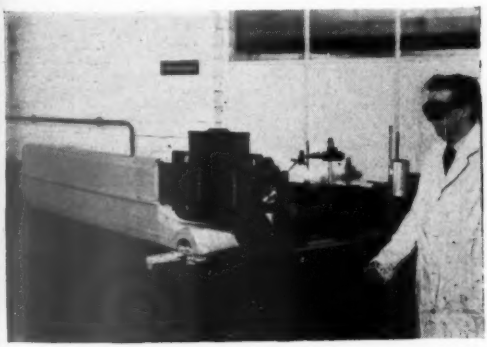
FIG. 19.—*Section of the Metropolitan-Vickers coreshop in which the CO_2 Process is used.*

paratively new technique, of which the company's technicians are among the leading exponents. For this purpose extensive new plant is housed in a specially-designed machine shop adjoining the main works.

Well-equipped laboratories provide constant control of melting plant, mould sand quality, and heat treatment while radiographic inspection is also carried out on castings of special importance.

It was in 1930 that the firm became associated with the David Brown organization and since the formation in 1951 of the David Brown Corporation, Limited, which controls sixteen separate companies and a world-wide network of agents, branch offices and representatives, the Jackson Division has formed part of the sub-division known as the David Brown Foundry Group. Thus, the Salford company forms part of an alliance whose products range from gears, gear-cutting plant, steel and bronze castings and precision tools, to agricultural tractors and two famous motor cars.

FIG. 20.—*Spectrograph control in the foundry test-room at Metropolitan-Vickers Electrical Company, Limited.*



Metropolitan-Vickers Electrical Company, Limited

Metropolitan-Vickers Electrical Company, Limited, is nearly as old as the electrical industry; it was founded, as the British Westinghouse Electric & Manufacturing Company, in 1899. Soon afterwards, work commenced on the construction of the present "main works." The foundation stone of the main offices was laid in 1901 by the Lord Mayor of London, and by the end of 1902 production was under way.

Despite some difficulties in the early years, by 1917 the company had become established as a highly-efficient organization with a sound reputation. The year 1919 saw the change to the company's present name, by which time the company had become entirely British, and the only remaining association with the Westinghouse Company of America was for some exchange of manufacturing and research information. In 1929, Associated Electrical Industries, Limited, was formed, linking the activities of Metropolitan-Vickers, the British Thomson-Houston Company, Limited, Ferguson Pailin, Limited, and the Edison Swan Electrical Company, Limited. This association still continues, extended by the inclusion of some subsidiary firms. With its formation the technical liaison with the Westinghouse Company of Pittsburgh ceased.

Over the years, the company has undertaken a wide range of manufacture including plant for electric power generation and transmission, electric traction and industrial electrification. The steady expansion in these fields, coupled with the newer activities of the company, has involved the construction of more buildings. The works, has, in fact, grown beyond the limits of the original site, as several local factories built or taken over for special wartime products are now used for normal manufacture. Such a large diversity of products, ranging from large turbo-generators to delicate instruments, has involved the manufacture of a similarly wide range of castings.

Foundries

The foundries, which cover an area of 212,913 sq. ft. and are divided into five parallel bays,

National Works Visit

produce castings in both iron and non-ferrous metals. They have not been enlarged since 1920, and in general remain as originally constructed early in the century, but their range of output during the last 50 years has expanded far beyond that originally intended. A comprehensive scheme of reorganization begun in 1947 led to the present standard of working conditions which are accepted by the authorities as complying in practice with the recent Foundry Regulations.

The main bay, in which the headroom is 80 ft., contains two 50-ton and two 25-ton cranes, while the side bays are equipped with 10-ton, 5-ton and 2-ton cranes. Nine cupolas are available and at least four of these work daily. They range from 30-in. to 72-in. dia. and have a total capacity of 54 tons per hour. Castings varying in weight from 1 oz. to over 60 tons reflect the wide range of the company's products. In the main bay green-sand, dry-sand and loam moulding methods are used and output has been increased by the core-assembly method of production, in parallel with the CO_2 process in coremaking.

At the N.W. corner of the building is the non-ferrous foundry (Fig. 18) where the company's requirements in brass and aluminium castings are manufactured. All the cores and certain types of moulds are made by the CO_2 process (Fig. 19). The die-casting section has now been re-housed and equipped with machines of larger capacity to meet the company's increasing needs.

Prominent features of the foundries are the wide and well-planned gangways, and the use of concrete floors wherever possible. Fume-removal plant is installed at knockout stations and at the melting points in the non-ferrous foundry. Hydroplast is used in the dressing shops, enabling castings to be cored without the usual dirt and dust. Routine sand control is maintained on all sands used in the foundries and microscopic, physical, chemical and spectrographic tests (Fig. 20) are all employed to ensure compliance with the company's established standards.

Efficient central heating is provided, and clothing lockers, bathing and washing facilities are installed at convenient points.

The staff in the foundries and the adjacent patternshop numbers just over 1,000 and a noteworthy feature of the organization is the importance attached to the training of apprentices.

Industrial Conveyors

A wide range of industrial belt conveyors described in a recent catalogue issued by Hugh Wood & Company, Limited, Dashwood House, 69, Old Broad Street, London, E.C.2, covers most of the operations to which they can be usefully adapted. Set out in a form for easy reference, the engineer can readily select the correct units to suit requirements. Particulars of various drives are included, such as single-drum driveheads of from 5 h.p. to 50 h.p. and tandem driveheads from 40 h.p. to 80 h.p.; also take-up and tail-end assemblies of the pulling-jack and the screw types; conveyor idler sets and conveyor intermediate sections; self-lubricating oil-filled rollers and many other accessories, dimensional details being included in all cases.

Equipment & Supplies

Main Metal

Main Metal (Great Britain), Limited, 69/71, Monmouth Street, London, W.C.2, have developed an aluminium/zinc base alloy of distinct interest to non-ferrous founders. The alloy is manufactured for them by International Alloys, Limited, for remelting for the production of either die- or sand-cast components or extrusions. It is designed to replace the more expensive bronze for a multitude of engineering applications—especially bearings. Its tensile strength is of the order of 22 tons per sq. in. with an elongation of three per cent. as sand cast and one per cent. as chill cast. As a pressure-die-casting it shows 35 tons per sq. in. in tensile with a three per cent. elongation (on 1 in.). However, the full range of properties to be expected are set out in a four-page leaflet to be obtained on request from the Monmouth Street address. Runners and risers can be incorporated in the charge when remelting the alloy, as the loss of zinc is almost negligible, but it is desirable that turnings and swarf be sent back to the refiners. Like other light metals, this alloy needs fluxing and other treatment when melting and methods and materials for this purpose can be recommended and supplied by the company. A number of components made from this alloy were inspected by a representative of the JOURNAL and appeared to be sound, of high quality and good surface-finish.

Portable Hardness Tester

C. Tennant, Sons & Company, Limited, 4, Copthall Avenue, London, E.C.2, have introduced an improved model (Fig. 1) of the Indentometer, a portable Rockwell-type hardness tester. The instrument, which may be used with loads of 150 kg., gives readings on the Rockwell "A," "B," and "C" scales; the load is applied through a hydraulic pressure unit. An improved zeroing device enables variations in atmospheric conditions to be counteracted under all possible circumstances, and a new method of mounting the penetrator facilitates changing from the conical diamond to a ball. An easy-to-read dial, and a carrying handle have also been provided. Various types of clamps are available for testing large specimens of awkward shape.

FIG. 1.—*New model of the Indentometer, a portable hardness tester produced by C. Tennant, Sons & Company, Limited, London.*

Düsseldorf Congress

Twenty-third International Foundry Congress—Opening Ceremony

Organized by the *Verein Deutsche Giessereifachleute* (the German foundry technical association) in connection with their 47th annual meeting, and under the management of its director, Dr. Philip Schneider, the 23rd International Foundry Congress was opened on September 1. Attended by 3,500 foundry specialists—including some 200 from this country, the opening ceremony was held in the Rheinhalle—a huge circular building which was originally constructed as a Planetarium. The platform was beautifully decorated with quantities of summer flowers. Dr. G. Schwietzke presided and, instead of the usual untidy litter of microphones, there was one placed over a reading desk at the right-hand side of the platform to which each speaker went when called upon to speak. At Dr. Schwietzke's left side was Mr. Vuilleumier of Switzerland, the president of the International Committee of Foundry Technical Associations. At his right, Mr. G. Lambert, the honorary secretary of this body. Apart from the official delegates, the only other person on the platform was Dr. A. B. Everest, the president-elect of the Association. Each delegate sat behind a large card indicating the country he represented. Amongst these were Mr. H. J. V. Williams (Great Britain), Mr. H. Dietert (USA), Mr. Brizon (France), Mr. Rene Depuis (Belgium), Mr. F. W. E. Spies (Holland), Mr. Nabarro (Spain), Mr. M. Olivo (Italy), Mr. Y. R. W. Granstrom (Sweden), Mr. J. Sissener (Norway), Prof. Ove Hoff (Denmark). Other countries represented were Japan, India and Finland. At the extreme left of the platform was a small wind orchestra who opened the proceedings by playing a sonata.

Dr. Schwietzke opened with a well-worded speech of welcome, the major points of which he summarized in both French and English. Then Mr. Max Vuilleumier took the rostrum and thanked the host association and invited everybody to go to Stockholm next year for the 24th International Congress. He, too, summarized his remarks in French and English which terminated with the official opening of the Congress.

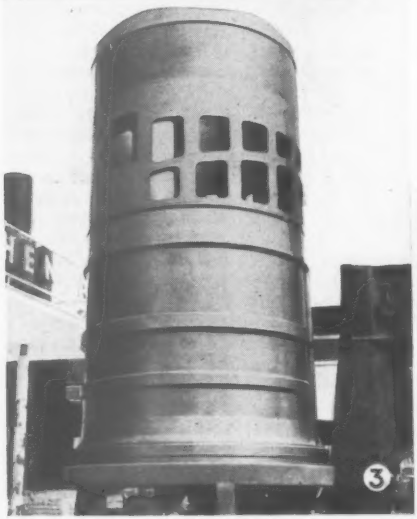
The next speaker, Mr. W. Hovelmann, who is the president of the German Foundry Industry Association, told of the great progress made in the industry. Its 1,000 ferrous foundries made in 1955 some 3,160,000 tonnes of cast iron; 315,000 tonnes of steel castings and 165,000 tonnes of malleable and is now fourth on the list of world's producers.

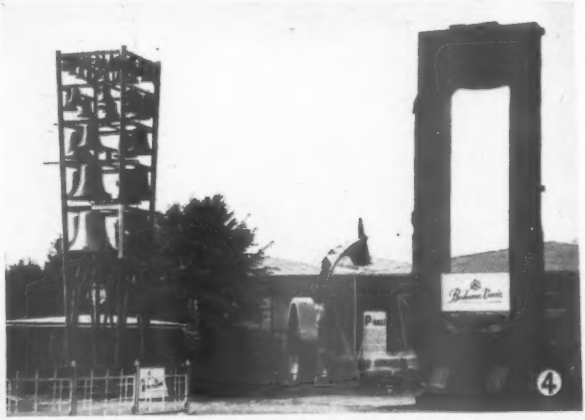
Dr. Schwietzke then awarded three certificates of honorary membership—the first one was especially popular as the recipient was Mr. J. H. Küster, the immediate past-president of the VDG—a position held with great distinction for many years. The next award was made to Mr. Max Vuilleumier, the president of the Swiss Foundry Technical Association. He is now a consulting engineer and was formerly with Georg Fischer and Sultzer Brothers. The final award was made to Mr. V. C. Faulkner in recognition of his work in disseminating technical knowledge as Editor of the FOUNDRY TRADE JOURNAL, and for his work in founding and developing international technical co-operation. Speaking in German, Mr. Faulkner thanked the members and president of the VDG for the great honour done to him, but pointed out that so far as the work of the International Committee was concerned, much credit was due to the late Mr. Tom Makemson, and in Germany, to Dr. Weiner and Geilenkirchen. A new award, the Piwowarski prize, was presented to two young students.

"Festival" Lecture

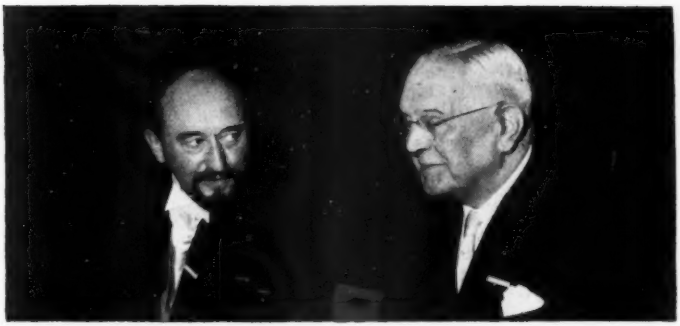
This country has the Williams, and America the Hoyt Lecture. At Düsseldorf, a similar feature was called the Festival Lecture. The lecturer was Dr. Meesen, Professor of Pathology at the Düsseldorf Medical School who took for his subject "Man and Technology." The following is an abstract of the lecture:—"The object of the lecture is to enhance the pleasure taken in technological achievement, on the occasion of this Congress, by an hour of reflection. The picture of man embraces the stages of biology, technological intelligence and culture and gives reason to enquire how man is adapting himself to his environment. The example of Neanderthal man proves that races can arrive in a blind alley of development and become extinct. The great dangers to which organisms are exposed are revealed by the fact that many forms of animal life have become extinct in our time. Slight advantages possessed by certain groups of the human race in the field of technological intelligence or in a civilized form of society may lead to the extinction of other groups. Such developments begin almost unperceived. The picture of technology is characterized by the purposive activities of mankind. Technology is not a monster, nor is it a neutral agent, but it is truly creative and works through its creations. Modern technology differs from manual skills in that it applies every mechanical device to wrest from nature her secrets. The danger to man is that he may be restricted by this mental outlook, measuring everything by its standards and becoming materialistic.

"The art of the founder embraces the four elements of the philosopher and is therefore not unrelated. In the casting process these four elements allow of comparisons from the field of biology. The founder's activity belongs to the sphere of modern technology and is therefore exposed to its dangers. The reactions to the use of a tool, a machine and a push-button are examined in detail. An example is given to show that any new tool may involve new dangers which are, however, often only recognized after a long period of use. The tool, and even more so the machine, makes man. It will be necessary to examine scientifically the





Photographs taken at the Düsseldorf Castings Exhibition, the key to which appears on page 295



Dr. G. Schwietzke, president of the German foundry technical association, and Mr. M. Vuilleumier, president of the International Committee of Foundry Technical Associations, shown at the Congress.

technological activities of man more than ever before with the eyes of the biologist and the doctor in order to maintain both health and productivity. Automation also entails biological consequences for technology. Although the highly-developed control principle was invented and developed by technologists, biological experience can be utilized in technology since nature herself provides the most complicated control systems. Specialization and automation are symptomatic of shortcomings in technology and biology. Specialization of the cells in multicellular organisms leads to higher efficiency which directly or indirectly is also of benefit to the individual cells. Specialization leads to a high degree of altruism which is, however, at bottom a refined form of egoism. To maintain its internal working conditions the organism is equipped with controls incorporating gauges, measuring instruments, etc., the body temperature and blood pressure, for example, are kept constant in this way. In biology these controls are often the points of maximum sensitivity, and the more complicated the system, the more sensitive are the controls. For technology this means: a chain is no stronger than its weakest link. Comparisons with biology show that by the nature of things the achievements of the technological world cannot attain the stars. Since in technology there is no other resource or spontaneous replacement of controls, man remains the most important controller. Tentative controls also afford a glimpse into the future. The adaptation of an organism to a changed environment is accomplished by tentative biological controls which can also take advantage of past experience. In addition to unconscious biological controls man can also profit by a range of experience and can utilize tradition and history in a tentative prediction of the future.

"The decision whether man will continue to exist in the modern technological world rests entirely with himself. The biological risks are still underestimated. All our working and living conditions must be re-examined. Modern man might also find himself in a biological blind alley caused, for example, by damage due to radiation. We must not allow machines and automation to act as a soporific on our technical intelligence. We can give free rein to our imagination in the field of the arts, which is related to the technological field. In the highest sense, however, man can only continue to exist if he remembers that he is an intelligent being. Upon this will depend whether he looks forward questioningly; for only in this way will he succeed in establishing an equilibrium in the field of force existing between himself and technology."

The final item on a lengthy agenda was the formal opening of the exhibition by the Lord Mayor of Düsseldorf, Mr. J. Gochlen.

Key to photographs on opposite page: (1) *Exterior view of one of the exhibition buildings;* (2) *View of a section of the exhibition grounds;* (3) *Cast-iron diesel-engine cylinder with* 32.8-*m. base and weighing* 1 *ton* 12 *cwt. (Junghaus-Stranggiess verfahren);* (4) *View of outside exhibition showing what is claimed to be the largest steel casting, weighing over* 250 *tons; to the left a carillon of steel bells;* (5) *Gear-worm wheel casting in Cu/Sn alloy, by Schweitzke;* (6) *"The Foundry Worker" by Peter Lipp—an example of art founding in cast iron.*

PRECAUTIONS to be taken when cargoes of zinc concentrates are carried on board ship are set out in Notice No. M397, obtainable from the Ministry of Transport and Civil Aviation, Berkeley Square House, London, W.1.

A CONTRACT worth more than £1,000,000, the second this year, has been placed with G. & J. Weir, Limited, Glasgow, for seawater evaporating and distilling plant which will supply 896,000 galls. of drinking water daily to the Netherlands Antilles island of Curacao off the coast of Venezuela. Provision will be made for future extensions as demand increases. The contract, from the island's council, includes power station buildings, boilers, turbo-generating sets, pumps, and piping.

THE BROKEN HILL PROPRIETARY COMPANY, LIMITED, Australia, is to spend about £A100,000,000 during the next five years on expansion, announced Mr. C. Y. Syme, the chairman, at the company's annual meeting. This revision of the five-year plan will be financed partly by an issue of £A1 shares at par payable in full during the first quarter of 1957; the issue is intended to raise £A6,000,000. The original five-year plan was to have cost £A67,000,000. Large furnaces to provide additional steel are already under way at Port Kembla, South Australia, and others are planned.

"Leo" Laps up the Mileage

Distance is obviously a major factor in transport cost and it is usually coupled with weight in fixing scales of charges for the carriage of freight. In the early days of railways it was laid down by statute that each railway company should measure the length of its track, and ever since then measuring the permanent way has presented innumerable problems. Distancing has inevitably contained many inconsistencies, and although many millions of distances have been calculated there are still gaps in records. Obviously a system of distancing reflecting company relationship and routing is out of date, and consequently, since nationalization, work has been in hand whereby the system can be modernized.

It is estimated that were this task to be undertaken by ordinary means, it would take at least 50 clerks five years to complete it. Thus, the British Transport Commission has been seeking to enlarge the application of electronic computers for suitable tasks in transport work, and in 1955 the Commission consulted Leo Computers, Limited, upon the possibility of using its "Leo" computer for the work. As a result, a method has been devised whereby comprehensive new distances will be produced by "Leo" from basic material supplied by the Commission. This involves a highly technical programme for the various stages of the operation, but instead of taking five years it will be finished inside a year. The basis will be the shortest physical distance, but, in return for this, railway users are accepting some grouping of places for distancing purposes, thus reducing considerably the number of distances to be calculated and put on record.

Improved Furnace Design Claimed

It is reported that a completely new kind of air furnace is being tested at Tees Foundry, the Middlesbrough subsidiary of Pease & Partners, Limited, Darlington. Its inventor, who has been working on it for 20 years, claims that it will revolutionize the processes for melting down iron for steelmaking, or into refined types of iron. Instead of firing from one side only, it is fed from both sides, the fuel impinging in the centre to produce greatly increased temperatures in less time. Working is said to be smoother, and control closer. The fuel is pulverized coal and it is claimed much less is needed than with ordinary methods of firing.

A trial run fulfilled all the hopes of the inventor, Mr. James Watson, of Newcastle, and test melts with a model 10-ft. long, 5-ft. high, have been carried out; with a capacity of 6 tons an hour, the furnace can hold 11 to 12 tons, and produce, according to the report, 15 tons of metal for 1 ton of coal consumed. During one test the furnace reached 1,700 deg. C. after about an hour and a half. The builder of the furnace, which is patented, is Mr. Thomas Bell, of Thomas Bell & Company, of Middlesbrough. The inventor, Mr. Watson, was for over 30 years chief engineer at Armstrong, Whitworth (Metal Industries), Limited, and Jarrow Metal Industries, Limited.

Production Index

On the basis of information so far received, the index of industrial production for July is expected to be 124-25 (1948=100). The index for July, 1955, was 122. In the first seven months of 1956 the index averaged 137, compared with 136 in the corresponding period of 1955.

The index number for June is estimated provisionally at 140, compared with 135 for May.

New Move in Scrap-metal Controversy

Under a quota licensing system, export of non-ferrous metals has been permitted for some time past. Semi-manufactured metal is also free for export, but scrap metal, except under certain strongly enforced conditions, is not allowed to leave the country. This long-standing controversy in the industry has been brought to a head by the publication of an official statement of policy by the Council of the National Association of Non-Ferrous Scrap and Metal Merchants.

The Council states: "It is patently unfair and uneconomic that manufacturers should enjoy a monopoly in consequence of exports being prohibited, and when it does not suit them, to refrain from purchasing, and leave the burden on the unprotected scrap metal merchant." Opponents of free trading urge that the consumers of non-ferrous scrap are in need of every ton of material available and that need is likely to increase. However, those who favour freedom all round claim that it would greatly enhance imports from the sterling areas. Importation from these sources of supply is at present reduced, owing to the low price here, and the consequent flow of material to European countries and to Japan.

Next month there is to be an open meeting in Birmingham of members of the Association, and if it is then found that the majority supports the council's pronouncement, renewed pressure will be brought upon the Government.

Organization of the BSI

At last week's annual general meeting of the British Standards Institution in London a move was made to streamline BSI's organization by combining the two formerly separate offices of president and of chairman of the General Council. Sir Herbert Manzoni (Birmingham's city engineer), who is already chairman of Council, was elected the first president under this new arrangement. He succeeds Sir Roger Duncalfe, chairman of British Glues & Chemicals, Limited, who, in the past 20 years, has held all the principal offices in BSI. Mr. John Ryan, vice-chairman of the Metal Box Company, Limited, was re-elected vice-president.

The following were elected as representatives of the engineering divisional council to serve on the General Council:—Mr. P. L. Jones, a director of Swan, Hunter, & Wigham Richardson, Limited; Mr. G. L. Newman, secretary of the Chief Engineer's Committee of Metropolitan-Vickers Electrical Company, Limited, and Mr. B. E. A. Vigers, assistant managing director of Laporte Industries, Limited.

No Benefit for Short-time Workers

A tribunal of National Insurance Commissioners has allowed appeals against the decision of local insurance tribunals who awarded unemployment benefit to engineering workers on short time. This decision thus upholds the view of the local insurance officers that benefit should not be paid to two workers, one employed at the Doncaster engineering works of John Fowler & Company, Limited, and the other at Blackpool by Mullard, Limited.

The Doncaster appeal raised principles which are likely to affect other claims. In that case an employee who had been working a four-day week had claimed unemployment benefit for the fifth day because of an agreement between the employers and the unions.

Hot-tearing—A Review Prepared by IBF Technical Sub-committee T.S.32

During the last ten years, a large amount of experimental work has been performed on hot-tearing. The literature is widespread and may not be fully appreciated by many foundrymen. The present review is intended to be a short statement summarizing the knowledge in this field.

Definition

As a result of earlier work, hot-tearing may be defined as the rupture of castings which occurs at temperatures near or above the solidus, *i.e.* during the process of solidification. Hot-tears present a characteristically jagged appearance and are usually discoloured. They may pass completely across the section or may be present only in the interior or start from some point of stress-concentration on the exterior, extending inwards for varying lengths. They naturally occur in the last portions of the casting to solidify. Corresponding to the jagged appearance of the crack, the course of fracture tends to be irregular and branched. Hot-tearing is caused by the inability of a part of the nearly-solid casting to deform sufficiently to accommodate the restraint offered to contraction by the material of the mould or by some other portion of the casting acting as a previously solidified stiff skeleton. The defect is particularly prevalent and has been intensively studied in steel castings and in aluminium alloys but also occurs in copper-base and magnesium-base alloys. It is much less frequent in grey cast iron. It has also been reported that malleable cast iron suffers from a similar defect, but no results of any technical investigation appear to have been published.

History

Hot-tearing was formerly attributed to the inability of metal to withstand the stresses imposed during contraction at elevated temperatures. Some of the most important early work was performed by Hall[1] on steel castings. He determined the mechanical properties of steel test-pieces cooling in the mould and demonstrated that, at temperatures close to but below the equilibrium solidus, most steels had very low, though measurable, tensile-strength values but no ductility. He designed a test-piece for measuring the tendency to hot-tearing of steel and made the important observation that if the hot region in which tearing occurred could be extended, the amount of tearing was reduced.

In the case of aluminium alloys, Scheuer[2] and Verö[3] had noticed that the tendency to hot-tearing was most marked when the constitution of the alloy was such that a relatively small proportion of eutectic was present. This observation was much extended by Lees[4] who developed the concept of a "eutectic index" which could be calculated from the composition and which could be used to indicate the tendency to hot-tearing. A very large amount of work on aluminium alloys was carried out at the University of Birmingham. Singer and Cottrell[5] demonstrated that aluminium/silicon alloys, above the solidus temperature, showed a small tensile strength with no ductility, thus paralleling the earlier obervation of Hall on steel. Singer and Jennings[6] related this hot-short range in aluminium/silicon alloys to the eutectic content and Jennings, Singer and Pumphrey[7] demonstrated a similar relationship in ternary aluminium alloys. Jennings and Pumphrey[8] showed that the effect of iron in improving the liability to hot-tears in aluminium/silicon alloys was due to the suppression of a low-melting-point eutectic, while Pumphrey and Lyons[9] showed the relationship between hot-tearing and constitution in a number of binary aluminium alloys of high purity. Pumphrey and Jennings[10] provided further evidence on the mechanical properties of aluminium/silicon alloys at high temperatures and the same authors[11] gave a general theory of hot-tearing as revealed by the work at Birmingham. This type of work has been extended by various other investigators[12] who generally reached similar conclusions.

In steel, following the work of Hall, several workers[13, 14, 15] observed a connection between hot-tearing and the form of sulphide and phosphide inclusions. Hall[16] and Middleton and Protheroe[17] found that high-sulphur contents were a major factor in promoting hot-tearing in steel. A most important contribution was made by Bishop, Ackerlind and Pellini[18] who took a series of radiographic photographs of solidifying steel castings and demonstrated that, just as in the case of aluminium alloys, hot-tears developed in steel above and not below the solidus. They were also concerned to point out the importance of the amount of local extension (strain) rather than the magnitude of the stress.

Although all the work described has led towards the conclusion that hot-tearing occurs at temperatures above the solidus, there is some evidence that, in aluminium alloys, cracking can occur at temperatures below the solidus, in cases where a fairly heavy and continuous envelope of a brittle constituent completely surrounds the dendrites. This was shown in various aluminium alloys by Pumphrey and Moore[19, 20].

The effect of gas content in aluminium alloys was studied by Lees[21] and information on the influence of mould materials on hot-tearing and on plastic deformation has been given by Middleton[22, 23], by Middleton and White[24] and by Parkins and Cowan[25].

Mechanism

All the work mentioned contributes towards a fairly consistent and clear picture of the mechanism leading to the formation of hot-tears. Most alloys solidify by a process involving progressive growth of crystal dendrites which are surrounded by a

Hot-tearing

eutectic liquid, whether the dendrites form a solid shell on the walls of the mould or whether they crystallize from independent centres so that the alloy solidifies in a pasty fashion. When temperature gradients occur in the casting—due to differences in section thickness or to running methods—the portion to solidify last is adjacent to completely-solid portions which are already contracting. This contraction is resisted by the material of the mould and the casting has to elongate to compensate for the hindered contraction. The skeleton of dendrites tends, therefore, to be drawn apart but, if there is a large amount of eutectic liquid around the dendrites, this will flow in to fill up any voids opened by the pulling apart of the dendrites, *i.e.* mass feeding will occur. At this temperature level, the partially-solid mass will possess a small tensile strength if the dendrites cohere but no ductility, just as has been revealed by the investigations into steel and into light alloys. Coherence of the dendrites will not occur until solidification of the metal in the vicinity is approximately two-thirds complete in cases where "pasty" freezing occurs. In cases where there is progressive growth of a solid shell, the situation is a little different, since on a given cross-section the solid metal will be able to support an appreciable stress whereas the interior of the casting may be completely liquid. When there is only a small amount of residual eutectic liquid remaining around the dendrites, it is extremely difficult for any feeding to take place and voids which are opened up by the movement of the dendrites remain unfilled. Furthermore, the actual amount of extension is concentrated into a small number of fine, interdendritic passages.

It should also be borne in mind that when there is a considerable volume of eutectic, the temperature will remain constant over a long period of time, while the eutectic solidification takes place, so that the amount of contraction which has to be accommodated during solidification is also reduced. Both from this point of view and from the point of view of the ability of liquid metal to flow between the dendrites, the worst conditions are experienced when there is a small amount of low-melting-point liquid around the dendrites, as was found in the work connecting constitution with tendency to hot-tearing in aluminium alloys. It also explains the very deleterious effect of sulphur on hot-tearing in steel, since the sulphur may be present as low-melting-point sulphides. These sulphides lower the actual solidus temperature to a level well below that of the equilibrium solidus. Such depressions of the solidus temperature may partially explain the earlier belief that hot-tearing could occur below the solidus, since the solidus considered was invariably taken as the equilibrium solidus.

Spreading the Hot Spot

The observation that the tendency to hot-tearing can be reduced by spreading the extent of the hot spot, *i.e.* by reducing the temperature gradients, is also in line with the suggested mechanism. If the hot spot is of very small extent, the whole of the extension of the casting is concentrated into this hot region and therefore into only a very small number of interdendritic channels. As the metal possesses practically no ductility at this temperature, hot-tearing must result from the concentration of strain. If the movement can be spread over a larger region and therefore over a larger number of interdendritic channels, hot-tearing is much less likely to occur.

As soon as the metal has become completely solid, ductility is rapidly acquired and the formation of hot-tears becomes far less likely. Hot-tears formed at temperatures above the solidus may be extended by subsequent contraction but it is not considered likely that the initial formation of the rupture occurs at temperatures below the true solidus.

Cure

Much of the work summarized above has been on metallurgical factors. In the case of aluminium alloys, the avoidance of compositions in which there is a small amount of eutectic will lead to a great reduction in hot-tearing. Similarly in steel, the use of steel of very-low-sulphur contents is helpful, and a high residual aluminium content will substitute harmless globular non-metallic inclusions for deleterious interdendritic films. Unfortunately, in many cases changes of this sort call for major alterations in specification which may not be acceptable to the customer or practical for other reasons and attention has to be directed to foundry practice.

The material of the mould, and in particular the ability of cores to collapse readily, is important. The work of Middleton[22, 23] on steel is some of the most informative. He has shown that, as would be expected, a green-sand mould causes less hot-tearing than a dry-sand mould; a high-density mould is also disadvantageous. The ability of the core material to collapse depends on the temperature reached by the core. Where the casting is small in relation to the core, an oil-sand core retains a high compressive strength during the time when the casting itself is in the hot-tearing range and under these conditions oil-sand cores produce more hot-tearing than clay-bonded cores. If there is a large mass of metal in relation to the core, then the oil-sand core will heat up rapidly and so will collapse more readily and there will be less hot-tearing in oil-sand cores than in clay-bonded cores. In any case, the ability to withdraw completely part of the mould material removes the restraint to cracking and, similarly, freeing of core irons is helpful.

Perhaps the method most generally applicable is to take steps to avoid the concentration of the hot spot into one small region. If the extent of the hot spot can be spread by thickening up the sections on each side, the strain is then distributed over a number of interdendritic channels and the tearing will be eliminated. Alternatively, chills (internal or external) can be applied to the hot region, but care must be taken not to overchill. Too large a chill will simply transfer the hot spot to a different location and will correspondingly move the site of the hot-tearing. Sometimes the provision of webs

across an angle which is tearing will be effective. This may be combined with the provision of a more generous radius to reduce the stress concentration and perhaps at the same time will serve to extend the hot spot and, therefore, to reduce the concentration of strain. The malleable cast iron industry also makes use of ties in cases where defects of this type occur. Lowering of the pouring temperature generally reduces hot-tearing, probably by reducing temperature gradients, but may not be applicable under practical foundry conditions.

This review is a very condensed summary of an extensive literature. Several other reviews may be consulted with advantage, including one by Middleton[26] and two by Caine[27, 28]. A very recent review by Dodd[29] (shortly to be printed in this JOURNAL) gives a particularly detailed survey of the metallurgical factors. It has been prepared entirely independently of the present statement.

REFERENCES

[1] H. F. Hall, Second Report of the Steel Castings Research Committee (Iron and Steel Institute *Special Report No.* 15), 1936, 65.
[2] E. Scheuer, *Metallwirtschaft*, 1935, **14**, 337.
[3] J. Vero, *Metal Ind.*, 1936, **48**, 431.
[4] D. C. G. Lees, *J.* Inst. Metals, 1946, **72**, 343.
[5] A. R. E. Singer and S. A. Cottrell, *J.* Inst. Metals, 1947, **73**, 33.
[6] A. R. E. Singer and P. H. Jennings, *J.* Inst Metals, 1947, **73**, 197.
[7] P. H. Jennings, A. R. E. Singer and W. I. Pumphrey, *J.* Inst. Metals, 1948, **74**, 227.
[8] P. H. Jennings and W. I. Pumphrey, *J.* Inst. Metals, 1948, **74**, 249.
[9] W. I. Pumphrey and J. V. Lyons, *J.* Inst. Metals, 1948, **74**, 439.
[10] W. I. Pumphrey and P. H. Jennings, *J.* Inst. Metals, 1948-49, **75**, 203.
[11] W. I. Pumphrey and P. H. Jennings, *J.* Inst. Metals, 1948-49, **75**, 235.
[12] W. Patterson, R. Kümmerle and H. Lessenich, *Giesserei*, 1955, **15**, 805.
[13] K. Singer and H. Bennek, *Stahl u. Eisen*, 1931, **51**, 61.
[14] W. J. Phillips, *Foundry*, 1940 (July), **68**, 27.
[15] W. Crafts, J. J. Egan and W. D. Forgeng, *Trans.* Am. Inst. Mining Metallurgical Eng., 1940, **140**, 233.
[16] H. F. Hall, Third Report of the Steel Castings Research Committee (Iron and Steel Institute *Special Report No.* 23), 1938, 73.
[17] J. M. Middleton and H. T. Protheroe, *J.* Iron Steel Inst., 1951, **168**, 384.
[18] H. F. Bishop, C. G. Ackerlind and W. S. Pellini, *Trans.* Am. Foundrymen's Soc., 1952, **60**, 818.
[19] W. I. Pumphrey and D. C. Moore, *J.* Inst. Metals, 1948, **74**, 425.
[20] W. I. Pumphrey and D. C. Moore, *J.* Inst. Metals, 1948-49, **75**, 257.
[21] D. C. G. Lees, *J.* Inst. Metals, 1947, **73**, 537.
[22] J. M. Middleton, *Trans.* Am. Foundrymen's Soc., 1953, **61**, 167.
[23] J. M. Middleton, *Trans.* Am. Foundrymen's Soc., 1955, **63** 99.
[24] J. M. Middleton and J. White, *Proc.* Inst. Brit. Foundrymen, 1955, **48**, A101.
[25] R. N. Parkins and A. Cowan, *Proc.* Inst. Brit. Foundrymen, 1953, **46**, A101.
[26] J. M. Middleton, *Iron and Steel*, 1949, **22**, 407.
[27] J. B. Caine, *Foundry*, 1953 (June), **81**, 120.
[28] J. B. Caine, *Foundry*, 1954 (August), **82**, 76.
[29] R. A. Dodd, Research Report PM 184 of Physical Metallurgy Division of the Dept. of Mines and Technical Surveys, Ottawa.

Publications Received

FBI Overseas Scholarships. Report to March 31, 1956. Published by the Federation of British Industries, Tothill Street, London, S.W.1.

The Rt. Hon. A. R. W. Low, Minister of State, Board of Trade, once described this scheme as a "far-sighted and imaginative enterprise" and no more apt description could be given. The FBI select, sponsor and, through their members, train three types of students. The importance of this enterprise to the foundry industry cannot be overstressed. As a very high proportion of the 109 participating firms are manufacturers of castings it is not an altruistic scheme for it is well established that business arising in firms abroad goes to the country where the executives have been trained.

OEEC at Work for Europe. Published by the Organization for European Economic Co-operation. Free from the OEEC Information Division, 2, Rue André Pascal, Paris 16.

To most people, the letters OEEC are, only after deliberation, properly interpreted as the Organization for European Economic Co-operation. To the question as to what they do, the answer from most would be that they busied themselves with increased productivity. Yet this is but a section of the activities of this organization, and probably no more important than the aid it gives to agriculture. However the best way of realizing its vast activities is to read this 100-page interesting booklet.

Mond Magazine No. 1—July 1956. Published by Mond Nickel Company, Limited, Publicity Department, Thames House, Millbank, London, S.W.1.

This is a new publication to be issued periodically to all interested in nickel and its by-products. It includes illustrated articles and notes on many subjects and in future issues there are to be articles on uses of nickel, copper, cobalt, gold, silver, the platinum metals, selenium, tellurium, sulphur and iron ore. Many readers will find this new periodical of interest, and copies are obtainable free of charge from Thames House.

Notes from the Branches

South Africa

The first meeting of the 1956/57 session of the South African branch of the Institute of British Foundrymen was held on Thursday, July 26, and was presided over by Mr. G. F. Alexander. A lecture was delivered by Dr. J. H. Cannon and Mr. A. L. Bradley, entitled "Refractories in the Foundry" and dealt principally with cupola refractories. The authors stated that the failure of refractory materials under service conditions could be attributed to one or more of a number of factors. Spalling of the lining could take place, *e.g.*, during the rapid cooling of a cupola when the bottom was dropped or in the cooling of an arc-furnace side walls when charging took place. Pure abrasion was responsible for considerable lining wear; this could be due to the motion of solid material over a lining or to the "cutting" effect of hot gases, usually laden with dust or slag. Chemical reaction between slag and lining was known to be a major cause of failure in all melting units where the slag came into contact with and wetted the lining; due to excessive temperature being developed, fusion of the refractory might take place. This was encountered in arc-furnace practice, where the dripping of the silica roof was by no means an uncommon occurrence. The state of the furnace atmosphere could also contribute to failure; alternation from oxidizing to reducing conditions led to the well-known "bursting" of chrome/magnesite bricks and carbon refractories were, of course, very rapidly burned away in oxidizing atmospheres. The authors pointed out the chemical and physical aspects of lining life; finally a summary on basic-cupola operation was given. The subsequent discussion indicated the interest in a paper of this nature and the vote of thanks proposed by Mr. Jack Tonge was heartily accorded.

BRITISH TRANSPORT WATERWAYS DIVISION announce that Cromwell Weir, some five miles downstream from Newark on the River Trent, is to be reconstructed at a total cost of over £250,000.

Increased Output of Iron Castings

The following is a detailed commentary by the Council of Ironfoundry Associations on the Iron and Steel Board's announcement of iron castings production in the second quarter of 1956.

Total Output

United Kingdom output of iron castings for the second quarter of the year was 2 per cent. below the level reached in the previous quarter, but 3 per cent. higher than the level recorded for the second quarter of 1955.

Output for the first half of 1956 exceeds that for the first half of 1955 by 3 per cent.

Ingot mould output, which was running at a high level in the first quarter, established a new record level in the second. The quarter's output of automobile castings showed a sharp drop (8 per cent.) on the corresponding period of 1955; the figures for the first half of 1956 being slightly lower (3 per cent.) than for the first half of 1955. Both engineering and pressure-pipe castings output registered small gains on the corresponding 1955 output, but the reduced levels of output in the building and domestic section for the first quarter of the year were also apparent in the second quarter.

Iron castings for railway equipment showed a sharp rise in the second quarter. Table I shows the output of iron castings in the first and second quarters of 1956 compared with the corresponding quarters of 1955.

TABLE I.—*Production of Iron Castings, by Sections.*

Section (grey and malleable) iron castings).	1955.			1956.			1956 percentage change on corresponding periods of 1955.		
	First quarter.	Second quarter.	First half year.	First quarter.	Second quarter.	First half year.	First quarter.	Second quarter.	First half year.
Ingot moulds	93,320	91,050	184,370	107,780	113,960	221,740	+15.5	+25.2	+20.3
Automobile (including tractors)	135,060	136,010	271,070	137,080	124,840	261,920	+ 1.5	− 8.2	− 3.4
Engineering	370,610	368,630	739,240	387,570	378,850	766,420	+ 4.6	+ 2.8	+ 3.7
Building and domestic	151,880	147,640	299,520	144,180	140,860	285,040	− 5.1	− 4.6	− 4.8
Pressure pipes and malleable tube fittings	187,480	178,700	366,180	189,710	183,380	373,090	+ 1.2	+ 2.6	+ 1.9
Railway equipment	75,170	69,130	144,300	73,350	80,150	153,500	− 2.4	+15.9	+ 6.4
TOTAL	1,013,520	991,160	2,004,680	1,039,670	1,022,040	2,061,710	+ 2.6	+ 3.1	+ 2.8

Raw Materials

The ironfounding industry's consumption of its principal raw materials is shown in Table II. Pig-iron stocks have been tending to fall whilst scrap stocks have risen, but in the last quarter some rise in the proportion of scrap charged has taken place.

TABLE II.—*Pig-iron and Scrap Consumption by Foundries.*

	Tons.		Percentage increase.
	1955 Second quarter.	1956 Second quarter.	
Pig-iron (including refined iron)	624,200	627,300	+ 0.5
Scrap (about half is foundry circulating scrap)	790,000	804,100	+ 1.8

The production by district is shown in Table III.

Labour

The number employed in the ironfounding industry at June 30 was 143,343—a fall of 1.4 per cent. in the labour force from the level of 145,444 which obtained at the end of the previous quarter.

TABLE III.—*Iron Castings Production, by District.*

District.	Iron castings (tons).	
	Second quarter 1955.	Second quarter 1956.
North East	78,250	81,390
North West	125,260	138,080
Yorkshire	109,640	109,810
East Midlands	196,960	201,840
West Midlands	199,270	191,420
Eastern Counties	38,980	39,340
Southern Counties	89,090	81,100
Scotland and Northern Ireland	105,650	110,160
Wales	53,500	68,900
TOTAL	996,600	1,022,040

Earnings at Record Levels

Provisional figures of the average weekly earnings in the last pay week in April of 7,000,000 manual workers show that a new high level of £9 17s. 6d. was reached. The Ministry of Labour and National Service conducts a half-yearly inquiry into the earnings of manual workers in all the manufacturing industries and in the mining, building, public-utility, and transport industries. For the purposes of the inquiry men, youths and boys, women and girls are taken together. The average of £9 17s. 6d. at the end of April includes bonuses, overtime, etc., but is arrived at before deduction of income tax or insurance contributions; it compares with an average of £9 7s. 2d. in October, 1955, and £2 13s. 3d. in October, 1938.

For men, aged 21 years and over, the average weekly earnings in April were £11 15s. 4d., compared with £11 2s. 11d. in October, 1955, and £3 9s. in October, 1938. Average weekly hours were 48.6, compared with 48.9 in October, 1955; in October, 1938, they were 47.7.

In the manufacturing industries only the average weekly earnings of manual workers were £9 15s. 1d. in April, 1956, compared with £9 5s. 9d. in October, 1955. The average earnings of men only in these industries were £12 2s. 2d., against £11 11s. 1d. six months earlier.

THREE ROLLER-HEARTH FURNACES are to be built by Birlec, Limited, Birmingham, for the new factory, near Glasgow, of the Caterpillar Tractor Company, Limited. A 400-kw. furnace for hardening forgings, a 320-kw. double-ended furnace for tempering rough and machined parts, and a 475-kw. continuously-driven furnace with cooling and soaking sections for cycle annealing comprise the order.

Patents and Income Tax

By a Legal Correspondent

In recent years, Parliament has relaxed the rules as to taxation in respect of payments made in respect of the grant of patent rights, so as to afford incentives not only to inventors to put new ideas into practical operation, but also to manufacturers to equip their factories with new and modern equipment. Prior to the Income Tax Act, 1945, the chief concern of the grantor of patent rights was to secure that payments he received should be in the nature of capital payments, which accordingly would not form part of his taxable income, while that of the grantee was to secure that the payments he made should be deductible as part of his trading expenses, so as to reduce his tax liability as far as possible.

Capital or Revenue Receipt

The question whether a payment constitutes a capital or revenue receipt while it may still arise is not of so much practical importance at the present time because of the alterations made in the Income Tax Act, 1945. Prior to this Act, attempts were made, sometimes successfully, to avoid tax liability by providing that the consideration for the transfer of the patent rights should be a lump sum payment, instead of a series of royalty payments.

The principal test for determining whether the payment was capital or revenue was whether the payment exhausted or depreciated to any considerable degree the rights of the patentee. If it did, it would be regarded as capital; if not, as revenue.

A royalty or annual payment would, of course, constitute an income receipt. The grantee of the rights, in making the payment, would deduct tax at the standard rate from the gross sum payable, and he would retain the tax deducted insofar as the payment was made out of profits and gains brought into charge; and insofar as it was not, he would be accountable to the revenue for the tax deducted.

Where the payment was of a capital nature, it would not be taxable in the hands of the recipient, and similarly, it would not be deductible from his profits by the payer, for such a deduction would have been precluded by Rule 3 (m) of Cases I and II of Schedule D.

Important changes, however, were introduced by the Income Tax Act, 1945, so as to give relief to persons acquiring patent rights in respect of which lump sum payments of a capital nature had been made.

The payer was henceforth to be entitled to have the payment taken into account in determining his taxable profits. The relief, however, was not obtained by deducting the lump sum from his profits; but by granting an annual allowance over a period of time in reduction of his profits. The relief granted obviously meant a loss of tax to the Revenue, but the Act of 1945 counterbalanced the position by providing that the lump sum payment should be treated as a revenue receipt in the hands of the recipient.

Royalty Payments

The grantor of the patent rights accordingly was now to become liable to pay tax in respect of the payment received. Further amendments were also introduced with regard to royalty payments. Under Section 41 of the 1945 Act (now S.472 of the Income Tax Act, 1945) the recipient enjoyed the option of having the royalty treated as if it were payable in six instalments at yearly intervals, provided that the right to the user of the patent extended over a period of six complete years or more, and that the necessary application for relief was made under this section to the revenue. In this way the recipient of the royalty or other sum might reduce his liability not only to income tax but also to sur-tax.

For example, if the recipient's income, apart from the royalty, was £1,400, and the royalty payment amounted to £1,200, he would ordinarily have been liable to sur-tax because his income in the year of receipt would be £1,400 plus £1,200= £2,600. If, however, the taxpayer exercised his option, the royalty of £1,200 would be spread over six years, and would amount to £200 for each of the six years; thus, his income would be £1,400 plus £200 in the year of receipt, *i.e.* £1,600.

Purchaser Paying Lump Sum for Patent Rights

It is necessary to consider the position of the person who purchases the patent rights for the lump sum. Formerly, the payment would have been of a capital nature, but now the buyer, under Section 35 (now S.316 of the I.T. Act, 1952), becomes entitled to an annual allowance in respect of this expenditure on the purchase of the rights. The amount paid will be spread over 17 years, that is, if the rights have been transferred to him for at least that length of time, or for a lesser period according to the period of the grant.

Where there has been an interval of time between the date of the commencement of the patent and the date of the grant of the rights therein, and such interval amounts to at least one complete year, the number of complete years in that interval must be deducted from the 17 years, or such lesser period for which the grant has been made.

For example, rights are bought in 1952 for £17,000. The allowance of 1/17th would be £1,000 a year for 17 years, beginning with the year 1953/4, if the rights had been granted for at least 17 years. But if they had been granted for only 10 years, the allowances would work out at £1,700 per year for each of the 10 years beginning with 1953/4.

Supposing that there was an interval of seven years between the date of the commencement of the patent and the date of the grant of the rights in 1952, the allowances would be spread over 17— seven years=10 years (that is, if the rights were granted to the purchaser for 17 years). If the rights had been granted for, say, only 10 years, then the spread over would be for a period of 10—seven years=three years, the amount of the allowance being proportionately increased in each year. Incidentally, it should be noted that under para. 16 of Part II of Schedule VI of the F.A., 1952,

expenditure incurred after July 19, 1952, in respect of the acquisition of future rights in a patent, not yet granted, will be treated as expenditure on the purchase of patent rights.

Position of Seller of Patent Rights

The position of the transferer of the rights is governed by S.138 of the I.T. Act, 1952, which replaces S.37 of the I.T. Act, 1945.

The lump sum payment, which previously to the 1945 Act would have been a capital receipt, will now be taxed. The amount of the payment, however, will be spread over six years, the first year being the year of assessment in which the sum in question has been received.

Thus, if the payment received amounted to a lump sum payment of £6,000, the payee will be regarded as receiving 1/6th, *i.e.*, £1,000, per year for each of the six years in question. The payee, the transferer, however, may at his option have the whole sum treated as a receipt for the year in which it has in fact been received by him.

Transferer Not Resident in the UK

If the transferer of the patent rights is not resident in the United Kingdom, the transferee will be responsible to the Revenue for the collection of the tax. He is required to deduct the whole of the tax in respect of the whole of the lump sum payment. In other words, there will be no notional spread-over for this purpose. The "non-resident" seller, however, may thereupon claim the relief of having the total sum spread over six years.

This relief will not be granted unless it is claimed by the non-resident within 12 months after the year of assessment in which the sum has been paid, by written notice of claim to the Commissioners.

Patents Subject to Several Dealings

Where the patent rights have changed hands more than once, the special provisions of S.318 (3) of the I.T. Act, 1952 (formerly S.37 (3) of the 1945 I.T. Act) secure that the tax is not charged more than once. Each subsequent seller after the original seller is not liable for the whole of the tax on the price paid by him. His liability is limited to tax of the difference between the amount paid by him for the rights on the one hand, and, on the other, the amount received by him on their resale by him.

Sale of Patents with Other Assets

In order to prevent evasion of the tax, S.326 of the I.T. Act, 1952 (formerly S.58 of the I.T. Act, 1945) provides for the apportionment of the consideration where patent rights are sold with other assets or property. The revenue in such a case will allocate the proper proportion of the purchase price to the patent rights themselves. Thus, tax cannot be evaded by, for instance, the allocation by the taxpayer of a low price to patent rights which are included with other property in a composite sale. Property "sold in pursuance of one bargain" will be treated as being "sold together with other property," so as to bring the case within S.326. And the property sold in pursuance of one bargain will be treated as being sold together, although separate prices are fixed by the parties for separate items of the property, or separate sales are effected in respect of separate items.

Sale at Less than Market Value

Section 327 of the I.T. Act, 1952, which replaces Section 59 of the I.T. Act, 1945, is aimed at sales of property at prices less than market value. In certain circumstances, the revenue will be entitled to treat the sale as having, in effect, been made at the proper market value and accordingly at a higher figure, and all the parties to the transaction will be assessable to tax on the basis that a proper market price has in fact been paid for the property subject to the sale (see para. 2 of the 14th Schedule of 1952).

These provisions will apply only to sales and not to other transactions, such as exchanges, and they will apply only in the circumstances set out in paragraphs (*a*) and (*b*) of S.327.

Paragraph (*a*) requires, in order that the section should apply, that either (*i*) the buyer should be a body of persons over whom the seller has control, or (*ii*) the seller should be a body of persons over whom the buyer has control, or (*iii*) both the seller and the buyer should be bodies of persons over both of whom some third person has control.

Alternatively, paragraph (*b*) of Section 327 requires, in order that the section should apply, that the sale or main benefit expected to accrue from the sale should be the obtaining of an allowance or deduction for wear and tear or for obsolescence or for exceptional depreciation or for expenditure on scientific research.

West German Output

In August, for the first time, West German crude steel production exceeded 2,000,000 tons. According to preliminary figures issued by the Government's Office of Statistics recently, last month's output reached a new post-war record of 2,045,471 tons. This compares with the previous month's 1,955,805 tons and the August output was 9 per cent. above the level of August, 1955. The previous peak of 1,980,000 tons was reached in March this year. The increase last month is attributed chiefly to the fact that new production installations had started working. Further increases in output are expected in the next few months.

During January-August, steel production totalled 15,300,000 tons, compared with 13,970,000 tons in the first eight months of last year.

Pig-iron production in August totalled 1,506,093 tons, against 1,504,983 tons in the previous month.

Mr. S. E. GILLIES has joined the Railway & General Engineering Company, Limited, Nottingham, as the director of sales.

Dr. CHRISTOPHER MACRAE, who has been secretary of the Scottish Council (Development and Industry) since 1946, has been appointed to the new post of Professor of Industrial Administration at the Royal Technical College, Glasgow.

Book Reviews

Oxygen in Iron and Steel Making, by J. A. Charles, W. J. B. Chater and J. L. Harrison. Published by Butterworths Scientific Publications, 88, Kingsway, London, W.C.2; price 43s. 10d., post free.

In a foreword to this book, Sir Ernest Lever describes it as a most valuable work, and states that it will prove a notable addition to our technical literature, and the writer of this review wholeheartedly agrees with him. The use of oxygen has clearly come to stay in the production of iron and the steels produced by the orthodox processes—Bessemer and Tropenas, open-hearth and electric arc. Since the high-frequency furnace is essentially a melting rather than a steel-making unit, the use of oxygen in this connection has not received serious consideration, although this cannot entirely be ruled out in the future.

The book contains a critical review of the published information, together with the results of some trials hitherto unreported, and is divided into three sections. Section I is entitled "Treatment of Molten Metal with Oxygen," Section II "Blast-Enrichment with Oxygen in Solid Fuel Combustion," and Section III "Flame Enrichment." Each section contains an introductory chapter on general theoretical considerations, and although these are dealt with in a masterly manner, the reader will need some knowledge of chemical thermodynamics if he is to understand what is written. On page 5, incidentally, there is a printer's error where ΛH is given for ΔH.

These chapters are followed by practical details which cannot fail to impress the reader. In connection with the manufacture of stainless steel from 100 per cent. stainless-steel scrap charges, however, the authors, like so many others, apparently do not recognize the fact that processing consists of three stages: (a) melting under reducing conditions, where sulphur is removed; (b) oxygen lancing (oxidation), and (c) when reducing conditions once again prevail for the recovery of any chromium from the slag.

Oxygen-enrichment of the blast for the blast-furnace, cupola and the gas-producer are dealt with in Section II, whilst Section III discusses flame-enrichment. These two sections will prove of great interest to the fuel technologist. Chemists and metallurgists alike will find the book to contain much useful information and no steel-maker can really afford to be without it.

E. G.

Technical Reference Book of Compressed Air Terms and Standards. Published by the British Compressed Air Society, 32, Victoria Street, London, S.W.1; price 20s., post free.

The foundry industry must surely be amongst the most prolific users of compressed air and readers will welcome this new edition of an authoritative work of reference. Its hundred pages are divided into seven parts which take the subject from the definitions associated with compressed air through the whole subject to finish with tables on pipe-line losses. The most important chapter—that dealing with installation and maintenance—is one which (when its tenets are properly applied) can be a real money-saver and, wisely, reference is made to the cash losses that can be incurred through leaks. It is suggested that attention should be given to Section 4 of Part IV, wherein a number of foundry pneumatic tools are listed along with their normal air consumptions, and that the information given should be applied in the readers' own works. The whole book contains a wealth of material of value to users of compressed air.

Die-casting Process, by H. K. Baron. Published by Odhams Press, Limited, 96, Long Acre, London, W.C.2. Price 21s. net.

This book is a welcome addition to the scanty literature on die-casting, the title being exactly what the book is basically the "Die Casting Process." It is pleasantly presented and in fact the author makes the process sound too easy.

Die-casting is playing an ever-increasing part in industrial progress to-day, and the more useful and practical information that can be laid in the users' hands the better—whether they be buyers, designers, production engineers or students. The author has succeeded in this.

The chapters on the purchasing of castings and related production techniques are of practical value to both buyers and designers, as are the chapters on the finishing of castings. Students and apprentices will also find this book most useful and comprehensive. For those who wish to investigate certain aspects of die-casting in more detail, the book concludes with a 3½-page bibliography.

Stückzeit-und Kostenermittlung Im Giessereiwesen. (Time-study and cost procedure for foundry products) (in German), by Erich Mazuch. Published by Fachverlag Schiele & Schön, 10, Boppestrasse, Berlin, SW29 Germany. Price DM 12.40.

The book, using time-study and modern costing methods to embrace all foundry activities from pattern-making through moulding, coremaking, fettling, has evolved an interesting mathematical-graphic treatment of the subject.

House Organs

600. Vol. 30, No. 135. Published for George Cohen, Sons & Company, Limited, Broadway Chambers, London, W.6.

Of major interest to foundrymen is an article on "Foundry Methods at K & L"—that is K. & L. Steelfounders & Engineers, Limited. It is claimed that through the operation of a methods department the foundry is able to produce steel castings to the following tolerances:—

Less than 6 in., $\pm\frac{1}{32}$ in.
Up to 12 in., $\pm\frac{1}{16}$ in.
Up to 24 in., $\pm\frac{3}{32}$ in.
Up to 36 in., $\pm\frac{1}{8}$ in.
Up to 48 in., $\pm\frac{5}{32}$ in.
Over 48 in., $\pm\frac{3}{16}$ to $\frac{1}{4}$ in.

There is a well reasoned article on exhibitions by Mr. C. E. G. Nye, and as but few concerns can have had greater experience of this publicity activity than the author, it is authoritative. His appeal for greater showmanship by home efforts will be generally supported. There is a well-written article by Mr. Frank Rowe on a visit to North Africa.

Turnbridge News, Vol. I, No. 3. Issued by W. C. Holmes & Company, Limited, Huddersfield.

The main item in this issue is devoted to illustrations and recounting some of the activities of the firm's research and development department. Most of the work done is associated with the gas industry. Other news is of the sporting and social side of the works.

BIRLEC, LIMITED, industrial furnace builders, of Birmingham, has launched a new apprentice training scheme which, it is estimated, will cost about £20,000 annually.

New Patents

(Copies of complete specifications are obtainable from the Patent Office Sales Branch, 25, Southampton Buildings, Chancery Lane, London, W.C.2, price 3s.)

752,645. Auguste Thyssen-Hütte, A.G., of Duisborg, Hamborn, Germany, and Dortmund Hörder Huttenunion A.G., Dortmund, Germany.

A process for casting steel or other metals to form long bars not exceeding the length of the mould, being an improvement on patent no. 725,829 inasmuch as the casting is carried out in vertically-disposed chill moulds.

752,673. Arbed, Acieries Réunies de Burbach-eich Dudenlange, S.A., Avenue de la Liberte, Luxembourg, Grand Duchy of Luxembourg.

Process and apparatus for desulphurizing pig-iron, claimed to have a high degree of efficiency. The pig-iron is first freed from entrained blast-furnace or mixer slag. It is then fed to a partitioned container having a basic or neutral lining, a desulphurizing agent being present in the container to form a slag layer through which the inflowing pig-iron is caused to pass.

752,742. Sulzer Freres, S.A., Winterthur, Switzerland.

A method of making castings from carbon-containing ferrous metals or alloys. A cavity additional to the casting cavity is formed in the mould. Into this additional cavity is inserted a protective substance (such as petroleum coke, oxalic acid, pitch, heavy oil, brown coal, etc.) which is, or which produces a reducing gas during the cooling of the casting in the mould to prevent or reduce surface decarburization of the casting.

752,959. Firth Stirling Inc., 3113 Forbes Street, Pittsburgh, 30, Pa, USA.

Low-alloy high-speed steels. The proportions of the various components are also expressed in the specified atomic percentages which are claimed to show more clearly the balanced composition of the steel. These figures are shown in brackets after the normal expression in weight per cent. A typical composition, then, would be: C 1.05 to 1.30 (4.79 to 5.97); Cr 3.70 to 4.50 (3.70 to 4.80); Va 3.70 to 4.50 (3.97 to 4.86); Mo 2.20 to 6.00 (1.25 to 3.42); W 0 to 3.50 (0 to 1.05). The remainder is iron.

752,976. Mond Nickel Company, Limited, Thames House, Millbank, London, S.W.1.

A method of introducing into a body of molten metal, a solid addition agent that boils or decomposes at a lower temperature than that of the molten metal. The addition agent is put on, or in a plunger, outside a pressure vessel containing the molten metal. It is subsequently carried by the plunger through an inlet opening into the vessel, the plunger in its innermost position closing the inlet opening to render the vessel pressure tight. The invention is particularly applicable to the introduction of magnesium into cast iron, in the production of spheroidal-graphite.

IN THE ANNUAL REPORT of the Sheffield Cleansing Department for the year ended March 31 last, Mr. Cyril Fox, cleansing and baths superintendent, gives as one of the reasons for the decrease of 8,613 tons in refuse collected, the increasing popularity of the draught-controlled domestic fire and other modern grates. The total weight of refuse collected was 146,087 tons. The decrease is partly accounted for by the fact that where cinders used to be put into the dustbin, fine dust now goes in, with a consequent drop in weight.

New Catalogues

High-vacuum Melting Furnaces. Two pamphlets from Efco-Edwards Vacuum Metallurgy, Limited, Manor Royal, Crawley, Sussex, and 161, Queens Road, Weybridge, Surrey, cover a range of high-vacuum melting, induction, and resistance furnaces. The induction furnaces are available in two sizes, 28 and 56 lb., and dealt with in publication E 180/2; whilst the resistance furnace, having a capacity of ½ lb., is detailed in pamphlet No. 177/2. The advantages of vacuum melting have been known since the 1914 war, but it is only since the second one that the benefits have been fully appreciated. Where, as in aircraft construction, alloys with the best possible mechanical properties are essential, then vacuum melting is already well established. The pamphlets are available by writing to either of the addresses given above.

Soaking Pits. From Stein & Atkinson, Limited, Parnell House, Wilton Road, London, S.W.1, has been received a most elegant catalogue carrying the caption "Surface One-Way Fired Soaking Pits." These represent a post-1918 departure from the conventional reversing regenerative type of pit then in general use. The successful outcome of this development is shown by the fact that of all soaking pits installed in America since the end of the last war, approximately 90 per cent. are of the new type, and 170 pits have been installed, or are now under construction, in Britain and close on 300 on the Continent. The colour and black-and-white illustrations, layout, and letterpress of the catalogue are all excellent and a clear idea is given of the principles involved, advantages claimed and method of operation.

Industrial Films. By the film section of the United States Corporation's Mission to the UK, American Embassy, 5, Grosvenor Square, London, W.1, a catalogue has been published of 150 sound films which are available on loan without charge, for non-commercial showing. First there appears an index by subject category, and this includes such diverse industries as coal and laundry; nevertheless the metal industries are well catered for, eight films being listed in the foundry and forging section, and many others of interest to founders in such sections as industrial safety, iron and steel, die-castings, copper, etc. Next, there are printed in alphabetical order synopses of all the films, running times, and suggestions as to the type of audience which will be suited by each. The catalogue is available to readers on request to the Embassy.

Fire Detection. Pyrene Company, Limited, 9, Grosvenor Gardens, London, S.W.1, have used an eight-page leaflet to describe and illustrate a system of fire detection and warning based on the installation of a number of "heads." These immediately register any sudden increase in temperature through a control unit, which visually and audibly registers this change so that immediate action can be taken. It is mandatory that where 20 people are employed where highly inflammable materials are used, some fire-alarm system must be installed. This pamphlet is available to readers on writing to Grosvenor Gardens.

Copper Welding. An informative booklet has just been issued by the Suffolk Iron Foundry (1920), Limited, Stowmarket. The know-how on a number of interesting jobs is divulged in this 16-page nicely illustrated publication. It is available to readers on writing to Stowmarket.

Company News

TOOLPRO, LIMITED, precision engineers and press tool makers, of Ilford (Essex)—The company's share capital has been purchased by the Telegraph Construction & Maintenance Company, Limited.

ACROW (ENGINEERS), LIMITED—Permission for a scrip issue to capitalize £50,000 of undivided profits has been refused by the Capital Issues Committee under the new Order which took effect on March 14.

R. H. NEAL & COMPANY, LIMITED, manufacturers of mobile cranes, of Ealing, London, W.5—Net profit for the year ended March 31 was £62,529, against £75,447. Productivity of the company's works increased during the year by nearly 20 per cent.

CLIMAX ROCK DRILL & ENGINEERING WORKS, LIMITED—Sales for the year ended March 31 continued to expand and turnover was a record, the chairman, Mr. R. Ewing, states. Net profit, after tax, was £51,863, against £29,750. The dividend is held at 7½ per cent.

W. H. DORMAN, LIMITED—The chairman states that plant is fully employed and any larger increase in turnover can only come from the acquisition of the best and latest designed machine tools. To finance immediate requirements a £150,000 bank advance is to be obtained, subject to preference shareholders' consent.

PARMITER, HOPE & SUGDEN, LIMITED, manufacturing electrical engineers, of Manchester—Turnover has increased by 23 per cent. and during the first quarter of the present accountancy year the value of orders received represented a record for any corresponding period in the history of the company. The whole of the capital of J. F. Collier & Company, Limited, Macclesfield, specialist founders and engineers, has been acquired. The dividend of 30 per cent. is repeated.

EUCLID (GREAT BRITAIN), LIMITED, manufacturers of earth-moving equipment, of Newhouse (Lanarkshire)—The company announces the acquisition of all the outstanding shares of the Peterhead Gear Manufacturing Company, Limited, Peterhead (Aberdeenshire), which was established in 1952 to supply gears and other circular components to Euclid (Great Britain). Mr. George Strachan will continue to serve as works manager of the Peterhead company and the other directors will serve as consultants.

WELLMAN SMITH OWEN ENGINEERING CORPORATION, LIMITED—Total value of orders on the books is a record, Sir Peter G. Roberts, the chairman, reports. The demand for capital equipment shows no sign of abatement either in the United Kingdom or overseas and activity has been particularly marked in the mechanical section, where there has been a substantial volume of contracts for mechanical handling and processing units for the manufacture of steel strip. After allowing for depreciation and tax, net profit for the year ended March 31 was £280,810, against £243,438. The dividend is 22½ per cent., compared with 20 per cent. on the smaller capital last year.

GEORGE COHEN, SONS & COMPANY, LIMITED—Turnover and earnings in the year to March 31 were at record levels. Group earnings before tax were £439,391 higher at £1,856,808. The ordinary dividend is raised from 9 per cent. to 11 per cent. At a meeting on September 25 it will be proposed that the name of the company be changed to "George Cohen 600 Group, Limited," it having been decided to hive off the trading activities of the parent company to a new subsidiary and thus simplify the group's administration and control. To provide additional finance it is proposed to issue, by means of a placing, £1,500,000 6 per cent. unsecured loan stock, 1975/80, at par.

Increases in Capital

RICHARD LLOYD, LIMITED, makers of machine-tool equipment, general engineers, etc., of Birmingham, increased by £250,000, in 5s. ordinary shares, beyond the registered capital of £350,000.

BURGESS PRODUCTS COMPANY, LIMITED, electrical and acoustical engineers, etc., of Hinckley (Leics), increased by £150,000, in 5s. ordinary shares, beyond the registered capital of £300,000.

RATCLIFFS (GREAT BRIDGE), LIMITED, metal rollers, of Tipton (Staffs), increased by £250,000, in 117,000 ordinary and 133,000 unclassified shares of £1, beyond the registered capital of £1,000,000.

GREENWOODS & AIRVAC VENTILATING COMPANY, LIMITED, London, W.C.2, increased by £20,000, in 5,000 6 per cent. non-cumulative preference shares of £1 and 60,000 ordinary shares of 5s. each, beyond the registered capital of £30,000.

L. E. LAVENDER & COMPANY, LIMITED, manufacturers of and dealers in chemical and engineering equipment, etc., of Tunbridge Wells (Kent), increased by £23,000, in 6 per cent. cumulative preference shares of £1, beyond the registered capital of £2,000.

A. J. REECE & SONS, LIMITED, engineers, etc., of London, S.W.18, increased by £22,000, in £1 ordinary shares, beyond the registered capital of £3,000.

NAYLOR BROS., LIMITED, ironfounders, etc., of Golborne, near Warrington, increased by £30,000, in £1 ordinary shares, beyond the registered capital of £50,000.

R. WOODHAMS & SON (CONSTRUCTIONAL ENGINEERS), LIMITED, Hildenborough (Kent), increased by £3,000, in £1 ordinary shares, beyond the registered capital of £1,000.

Contracts Open

The dates given are the latest on which tenders will be accepted. The addresses are those from which forms of tender may be obtained. Details of tenders with the reference BSB can be obtained from the Board of Trade Export Services Branch, Lacon House, Theobalds Road, London, W.C.1 (telephone: CHAncery 4411, ext. 738 or 771), unless otherwise stated.

FORMOSA, September 26—Power cables, switchgear, etc., for the Central Trust of China, Purchasing Department. (ESB/21987/56/ICA.)

FORMOSA, October 5—Heat-treatment unit, machine tools, etc., for the Central Trust of China, Purchasing Department. (ESB/22451/56/ICA.)

INDIA, October 4—Truck-mounted cranes and crawler tractors, for the Government of India, India Supply Mission, Washington. (ESB/22077/56/ICA.)

SOUTH AFRICA, September 21—Furnaces, for the Stores Department, South African Railways. (ESB/21838-9/56.)

THAILAND, October 9—Machine tools, woodworking machinery, etc., for the Thai Technical and Economic Committee, Bangkok. (ESB/21920/56/ICA.)

Recent Wills

COWLIN, F. J., chief engineer of the steam-turbine division of the English Electric Company, Limited £6,572

WARD, JOHN, founder, chairman, and managing director of John Ward & Sons (Stourbridge), Limited, industrial glove manufacturers £42,835

THOM, R. G., technical assistant to the British Railways carriage and wagon engineer, Eastern and North-Eastern Region, at Doncaster £15,615

STOTESBURY, R. K., formerly managing director of Robert Stotesbury, Limited, manufacturers of mill furnishings, engineering specialities, etc., of Bristol £38,480

POCHIN, G. E., chairman of R. Pochin & Sons, Limited, Leicester, for many years a director of Goodwin Barsby & Company, Limited, plant and machinery manufacturers, of Leicester, and a director of British Hardware & Tools, Limited, Manchester £65,483

[INTESTATE]

EVANS, HOWARD, superintendent of the research laboratory at Birmingham of the Mond Nickel Company, Limited, and a former president of the Birmingham Metallurgical Society £8,923

LANE, R. B., manager of the Riscom Iron and Steel Works, Redcliff, Southern Rhodesia, formerly consulting and constructional engineer with the Rhodesian Iron and Steel Commission and Heap & Partners, Limited, refractory importers and engineers, of Liverpool, and at one time a metallurgist in the laboratory of Guest, Keen & Nettlefolds, Limited, Cardiff (estate in Great Britain) £4,488

News in Brief

THE TOTAL ATTENDANCE of the Düsseldorf foundry exhibition, which closed last Saturday, was in excess of 200,000.

ARGUS FOUNDRY, LIMITED, has had plans submitted for the proposed erection of a patternshop and store at Boydstone Road, Glasgow, S.W.3.

LAYCOCK ENGINEERING, LIMITED, Millhouses, Sheffield, are holding "open days" for the public for the first time. Six are being held in the fortnight ended Friday, September 14.

THE second World Metallurgical Congress, sponsored by the American Society for Metals, is to be held from November 2 to 8 at Chicago. It will be attended by 28 scientists from this country.

A SHOWROOM with a floor area of approximately 1,600 sq. ft. has been opened at the new regional headquarters of the A.E.I. Lamp & Lighting Company, Limited, at 74, Waterloo Street, Glasgow.

EMPLOYEES of F. H. Lloyd and Company's Burton Foundry beat their Wednesbury workmates to win the inter-departmental horticultural competition at the firm's annual show on Saturday, September 1.

THE EAST MIDLANDS BRANCH of the Institute of British Foundrymen will hold a meeting on September 20, at the Plough Hotel, Northampton, at 7.30 p.m., when the subject of a talk by Mr. W. Collinge will be "Running and Gating of Castings."

AN INQUIRY from an American company in Hollywood for several million dollars' worth of jigs and fixtures, tools, and dies for the US automotive and heavy engineering industries has been received by the Gauge and Tool Makers' Association.

A COURSE in advanced automobile engineering, covering such subjects as the principles of design and design calculations, metallurgy and applied mechanics relating to the major units of vehicles, is being instituted by Leyland Motors, Limited, for the younger engineers on the staff.

A MEETING of the Manchester section of the Institution of Production Engineers is to be held on September 17 at the Reynolds Hall, Manchester College of Technology, Sackville Street, at 7.15 p.m. A talk will be given by Mr. A. Talbot on the "CO_2 Process Applied to Coremaking."

LAST SEPTEMBER the P&O group of companies reserved berths for the building of 25 tankers of 500,000 tons deadweight at an estimated cost of £35,000,000. It is now announced that five of the ships will be built on the Clyde, 13 by north of England shipbuilders, and one at Dundee.

THERE will be a new venture for the new session at Huddersfield Technical College. It takes the form of a four-year "sandwich" course for the Higher National Diploma in Mechanical Engineering, in which students will spend six months studying and six months at an engineering works alternatively.

A 12 PER CENT. INCREASE in horsepower rating for all D9 tractors now in production is announced by the Caterpillar Tractor Company, Limited, Coalville (Leics). Flywheel horsepower of the big turbocharged crawler has been boosted from 286 to 320, while the drawbar rating of the direct drive model has been increased from 230 to 260 h.p.

LEICESTER is gradually becoming an engineering city, and its traditional industries of hosiery and boots and shoes are lagging behind, reports Leicester and District Employment Committee. Since 1949, 3,365 workers have left the shoe industry and over 700 the hosiery industry, while engineering and electrical goods have gained 1,370 workers.

AN OCCUPATIONAL HYGIENE DEPARTMENT, centred at Morriston, has been set up by Richard Thomas & Baldwins, Limited, to serve its works in England and Wales. Dr. G. Mathew is in charge of the project. The aim is prevention rather than cure, and the unit will tackle specific problems rather than carry out fundamental research.

CHAMBERLAIN INDUSTRIES, LIMITED, of Staffa Works, Staffa Road, Leyton, London, E.10, manufacturers of mobile and shop cranes, are now offering a hydraulically-operated extensible jib crane of Dutch origin mounted on a Mack diesel-truck with specially arranged cabin and controls permitting the crane to be operated from the cabin.

ARMCO, LIMITED, announce that as from September 3 they have been operating from their new plant in the Jubilee Road at Letchworth, Herts (telephone: Letchworth 2380—1 and 2). Invoices, statements and correspondence relating to financial matters should be sent to the administrative offices of the company at 75, Grosvenor Street, London, W.1.

RAPID MAGNETIC MACHINES LIMITED, Lombard Street, Birmingham, announce the establishment of a department specializing in automation and magnetic power. It is acknowledged that electronics, pneumatics, magnetics and hydraulics, will have a big influence on the development of automatic feeding and handling devices, and the company wishes to provide technical service to industry.

THE COUNCIL OF IRONFOUNDRY ASSOCIATIONS announce the publication in the autumn of "A Practical Guide to the Design of Grey Iron Castings for Engineering Purposes." The price of the book is not yet known, but overseas readers would be well advised to place their orders now, as the book is already known, through the original French editions, to be of a high order.

RAILWAY AND GENERAL ENGINEERING COMPANY, LIMITED, Meadow Lane, Nottingham, has received a contract worth £300,000 to build and maintain sidings at the High Marnham power station, the largest in Britain by the River Trent, 11 miles north of Newark. The firm is also working at present on a £250,000 contract in Nigeria and has other contracts in India, East Africa and Iraq.

A NEW public relations company, Galitzine and Partners, Limited, 17, Victoria Street, Westminster, S.W.1, has been formed to take over the contracts and staff of Galitzine and Partners. The company commenced operations on September 1, and the directors are Prince Yurka Galitzine (previously senior partner, Galitzine and Partners), Mr. S. W. Chant, O.B.E., and Sir Lindores Leslie, Bt., A.C.I.S., who is the company secretary.

BETWEEN 20 AND 30 WORKERS at the Cardiff factory of Lancashire Dynamo & Crypto, Limited, received notice on September 3. Mr. E. G. R. Jones, general manager of the factory, said it was possible that more would have to be dismissed temporarily, but no skilled men would be discharged. He added that the company was making every effort to avoid dismissals. The men are being stood off because Government contracts are coming to an end.

THE FRASER & CHALMERS ENGINEERING WORKS of the General Electric Company, Limited, has received contracts to the value of some £200,000 from Forges de la Providence S.A. of Marchienne-au-Pont, Belgium, for

(*Continued on page 308*)

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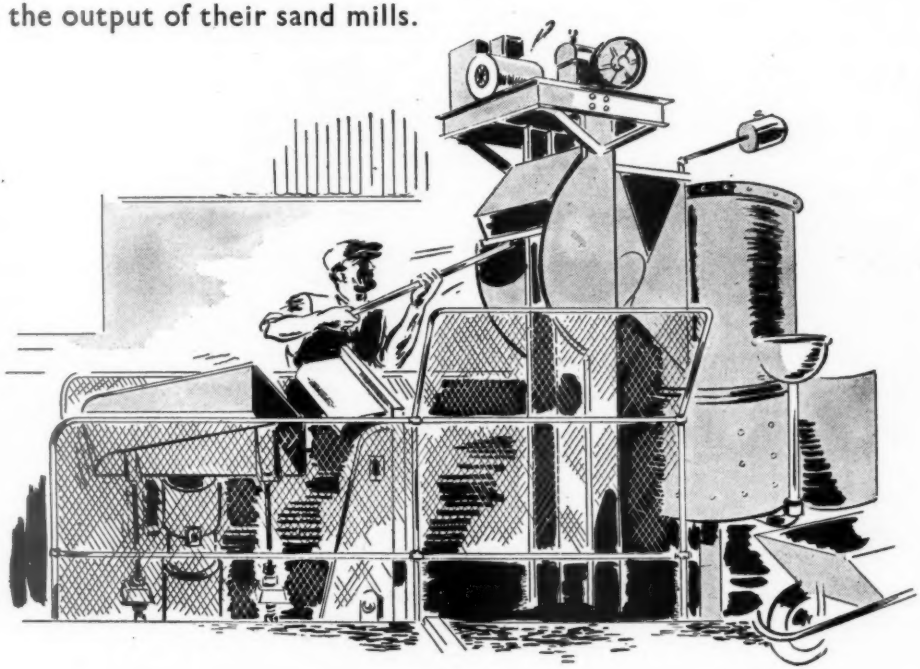

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THE FULLERS' EARTH UNION LTD.

Patteson Court, Nutfield Road, Redhill, Surrey

Telephone: REDHILL 3521

CMF 13

News in Brief

(*Continued from page 306*)

ore blending, crushing, screening and sampling equipment. Low-grade ore from the Briey district and imported Swedish ore will be handled by the blending equipment, densities varying from as low as 1.6 tons per cub. m. up to 3.2 tons per cub. m.

MILD-STEEL BILLETS of commercial quality are now being produced in a pilot continuous-casting plant at Barrow Steel Works, Limited, at, it is claimed, higher casting speeds than have been attained on any other known plant of this kind. The Rossi-Junghans machine at Barrow, on which extensive development work has been carried out over the past three years, is operating at speeds in excess of 200 in. per min.—the equivalent of 7 tons of 2-in. sq. steel billets per hour.

A NEW wheel camber castor and king-pin gauge is being shown on the Dunlop tyre service stand (No. 147), at the Commercial Motor Show, at Earls Court. The new gauge (CG/4-5) consists of two separate instruments with which camber and castor angles and king-pin inclination can be accurately and easily measured: CG/4 provides a quick and simple method of measuring camber angle and floor level, and CG/5 is a guage for castor angle and king-pin elevation giving both readings in a single operation. It can be attached to the stub axle nut, to a wheel stud or to a centre-lock wheel.

THE SOCIETY OF INDUSTRIAL ENGINEERS, 28, Victoria Street, S.W.1, announce that in co-operation with the Work Study Society they are sponsoring a conference, to be held at the Esplanade Hotel, Porthcawl, on October 26 and 27. The purpose is to show small- and medium-sized organizations how they may improve their efficiency without heavy capital expenditure, through the application of industrial engineering techniques. Full particulars and application forms may be obtained from: the conference secretary, 15, Alder Avenue, Ystradgynlais, Swansea Valley, S. Wales.

Mr. W. H. SHARP, director of Thomas Smith and Sons (Rodley), Limited, crane and excavator manufacturers, Rodley, Leeds, has returned from a 16-day tour of India with a contract worth £300,000. The order is for 27 cranes—18 ten-ton steam travelling cranes and nine five-ton—for use on Indian State Railways, to be delivered over the next two years. The firm, which employs 750 men at Rodley, recently completed a previous contract for supplying 24 cranes worth £250,000. The new contract was secured in the face of strong competition from Japan, Italy, Germany, Belgium and France.

A DISCUSSION GROUP on management in the heavy engineering industry has been organized this autumn by the Scottish office of the British Institute of Management in collaboration with the Glasgow and West of Scotland Management Association. The discussions which commenced on Monday, are designed for junior managers and management trainees in the industry and will take place at fortnightly intervals up to December 18. They are under the general supervision of Mr. Hugh McErlean, BIM manager for Scotland and will be held at the Institute's offices at 141, St. Vincent Street, Glasgow, C.2.

AT the Commercial Motor Show to be held at Earls Court, London, from September 21 to 29, Guy Motors, Limited, of Wolverhampton, will be showing for the first time a new underfloor-engined chassis. Emphasis is on lightness coupled with performance and economy in operation; the total weight of chassis and engine is only 3 tons 8 cwt. Type-named "Warrior", the wheelbase is 16 ft. 4 in., and power is provided by a 5½-litre Meadows 4DC 330 direct-injection four-cylinder diesel engine with five-speed gearbox and overdrive. Although intended primarily to carry a de luxe coach body, the new chassis is equally suitable for lightweight single-deck public service vehicles.

SIR PETER G. ROBERTS, chairman of the Wellman Smith Owen Engineering Corporation, comments favourably on the Group's acquisition of the Combe Barbour, Limited, Falls Foundry, Belfast, in his latest annual statement. The Corporation have been able to supplement production capacity by the output at the Falls Foundry. Active production began there last January and full output, which will be considerably increased, will enable the Corporation's works at Darlaston to be relieved and consequently concentrate on heavy steelwork. Apart from a grant by the Northern Ireland Government, finance at the Belfast foundry has been met from the Corporation's liquid resources.

WILD-BARFIELD ELECTRIC FURNACES LIMITED, Watford by-pass, Watford, Herts, announce the receipt of a contract from one of the leading German car manufacturers. The plant was ordered after thorough investigation and tests on production components. The first deliveries, due shortly, comprise four Wild-Barfield gas-carburizing furnaces, type GC.2454, operating with "Carbodrip", and include the requisite jigs and workbaskets to accommodate a multiplicity of automobile components. Certain of the items of control equipment are being supplied from German sources but the furnaces themselves are British made throughout and are being delivered as completely assembled units.

WITH THE OPENING of the Commercial Motor Show at Earl's Court on September 21, a complete range of pressure gauges for use with Blackhawk Porto-Power hydraulic equipment (*i.e.* up to 50 short tons) will be made available to industry in this country and overseas. The range is being presented by E.P. Barrus (Concessionaires) Limited, who are manufacturing Porto-Power equipment at Brunel Road, Acton, under licence to America. Details are as follows: Z721E gauge calibrated 0-10.000 lbs., to register line pressure transmitted from pump to ram; Z293E gauge calibrated to show total load applied by RC.159 or RC.160 ten short ton rams; Z494E gauge calibrated to show total load applied by RC.251 20 short ton ram; GA-100 SE gauge calibrated to show total load applied by RC.210 50 short ton ram.

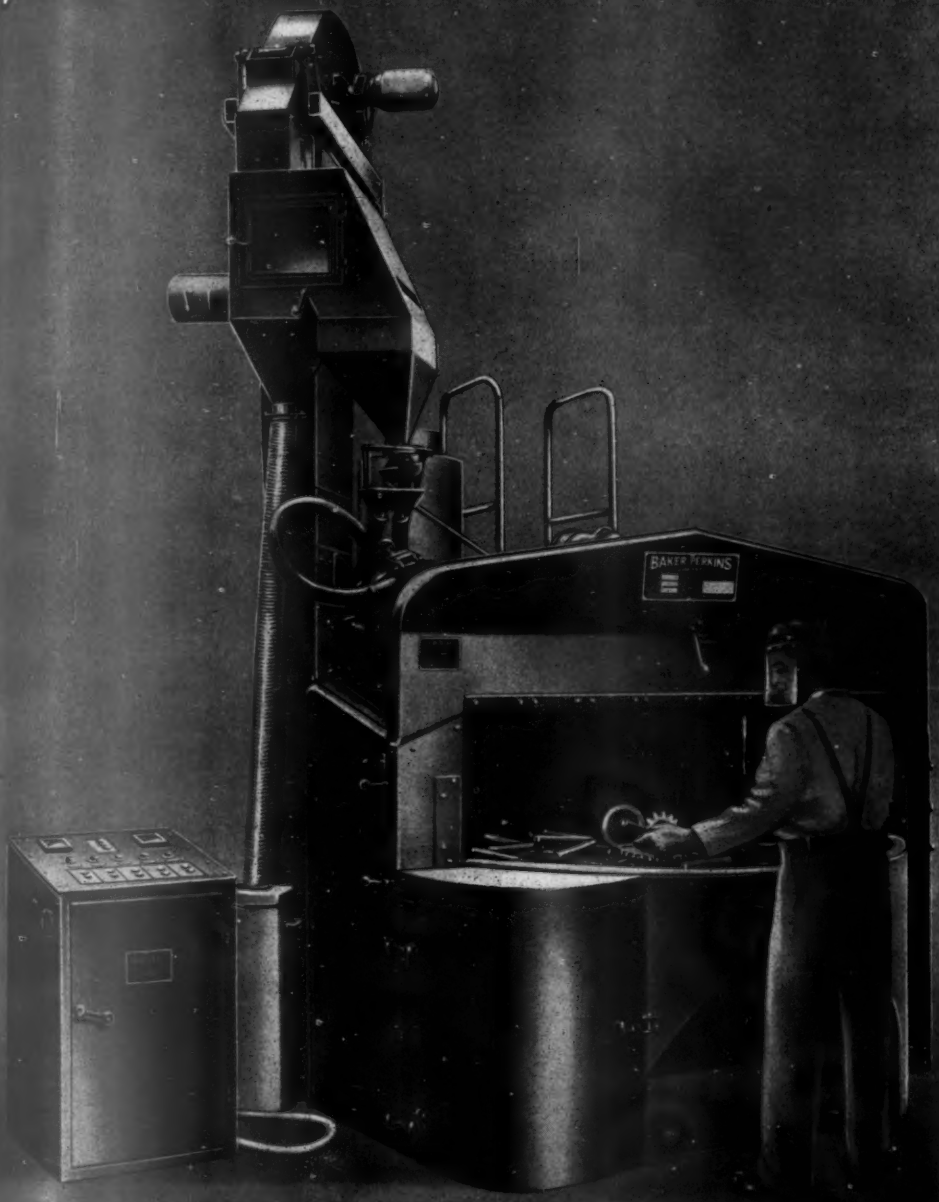
BTH's Big Contract for Kariba Project

Award of the biggest contract still outstanding for the Zambezi hydro-electric project at Kariba to the British Thomson-Houston Export Company, Limited, is announced by the Rhodesian Federal Supply Board. The company's contract, worth £2,121,141, is for the supply and installation of switchgear and other equipment for part of the transmission system at the Kariba switching station and at sub-stations.

A. Reyrolle & Company, Limited, Hebburn (Co. Durham), has been awarded a contract worth £36,157 for the supply and installation of switchgear for the Kariba power station.

BRITISH OXYGEN COMPANY, LIMITED—Lord Reith has been appointed a director. He is chairman of the Colonial Development Corporation and a director of Tube Investments, Limited.

BAKER PERKINS Shot Blast Equipment



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Raw Material Markets

Iron and Steel

Production of pig-iron continues to be concentrated mainly on the supply of basic steelmaking grades, for which there is no lessening in the demand. In spite of the impressive tonnages which are being supplied to them from home blast furnaces, increased quantities of imported iron have been necessary to augment supplies. New furnaces will, however, be brought into commission later in the year and the supply of home-produced iron will be increased appreciably. Although there is not now any urgency in the demand for foundry pig-iron, producers of these grades are generally able to dispose of their outputs; in any case, there is a ready market from overseas buyers and limited tonnages of all grades, other than hematite, are being shipped. The supply of iron ore is satisfactory and most of the furnaces have been able to augment their stocks. Furnace coke is also coming to hand quite well. Current outputs of hematite are absorbed by the steelworks and foundries. Suppliers of refined irons are able to undertake a much larger flow of orders than is at present being received. In some areas production of light castings appears to be expanding, but there is plenty of room for improvement. The textile and jobbing foundries could also take on much more work. Present outputs of high-phosphorus iron are equal to demands.

With the arrival of billets from abroad, many of the re-rollers have been able to augment their stocks and they are now fairly well off for supplies of semi-finished steel. There continues to be a good demand on home steelworks for supplies of billets, etc., however, and no difficulty is experienced in disposing of all arisings, although some users are now a little more discriminate so far as defective material is concerned. The re-rollers continue to carry good order-books.

Non-ferrous Metals

Non-ferrous metal markets look like being in for a further spell of uncertainty. The Cairo discussions have now reached an impasse, while the rather ugly situation developing on the Rhodesian Copperbelt, where about 75 per cent. of the underground workers have stopped mining, is a further factor. The real issues involved in this dispute are not clear. Certainly, not clear enough to evoke comment, except to say that the African Mine Workers' Union is not believed to be in a sufficiently strong financial position to withstand a prolonged strike. However, one of the major trouble spots plaguing the copper market on the other side of the Atlantic resolved itself when the United Steel Workers' Union and the Kennecott Copper Corporation reached agreement covering the workers at the Garfield copper refinery. The pact concluded is similar to that reached between the steelworkers and the Garfield copper smelter of the American Smelting & Refining Company. In the meantime, copper is firm in London, which is more than can be said for the market in New York, which is holding to the present price levels more by hope of increased demand emerging than by purchases.

There are no developments to report in tin, and this market remains firm in London and quietly steady in the US, where moderate buying of spot supplies is the feature. Lead is quietly firm in London, but fairly brisk on the other side, with battery manufacturers still absorbing large quantities. It is believed that the GSA only received token offers for stockpile purchases this month.

Zinc is a good market both here and in New York. In the US, trade in "Prime Western" is reported as brisk, with diecasters entering the market for reasonable quantities of high-grade metal.

Official metal prices were as follow:—

COPPER, Standard—*Cash:* September 6, £307 10s. to £308; September 7, £303 10s. to £304; September 10, £307 to £308; September 11, £307 to £307 10s.; September 12, £307 to £307 10s.

Three Months: September 6, £307 to £307 10s.; September 7, £303 to £303 10s.; September 10, £306 10s. to £307; September 11, £306 to £307; September 12, £306 to £306 10s.

TIN, Standard—*Cash:* September 6, £772 to £773; September 7, £772 to £773; September 10, £777 to £778; September 11, £782 to £783; September 12, £793 to £794.

Three Months: September 6, £768 to £768 10s.; September 7, £769 to £769 10s.; September 10, £772 to £772 10s.; September 11, £777 to £778; September 12, £785 to £786.

LEAD—*First half September:* September 6, £116 15s. to £117; September 7, £116 15s. to £117; September 10, £117 10s. to £117 15s.; September 11, £118 5s. to £118 10s.; September 12, £118 10s. to £118 15s.

First half December: September 6, £115 to £115 5s.; September 7, £115 to £115 5s.; September 10, £115 10s. to £115 15s.; September 11, £115 15s. to £116; September 12, £116 to £116 5s.

ZINC—*First half September:* September 6, £95 15s. to £96; September 7, £95 15s. to £96 5s.; September 10, £96 to £96 10s.; September 11, £96 5s. to £96 10s.; September 12, £96 5s. to £96 10s.

First half December: September 6, £94 to £94 5s.; September 7, £94 to £94 5s.; September 10, £94 to £94 5s.; September 11, £94 5s. to £94 10s.; September 12, £94 5s. to £94 10s.

Sentinel (Shrewsbury) Acquired by Rolls-Royce

Acquisition by Rolls-Royce, Limited, of the engineering firm of Sentinel (Shrewsbury), Limited, is announced. Metal Industries, Limited, has agreed to sell its holdings of approximately 96 per cent. of the preference and 90 per cent. of the ordinary shares at £1 0s. 6d. and £1 12s. a share respectively and Rolls-Royce offers to buy the balance of the shares on the same terms.

Sentinel (Shrewsbury), Limited, employs 1,700 workers. Sir Charles Westlake, chairman of Metal Industries, Limited, told a gathering of the workpeople that his company had to sell because of its financial situation. It could not afford to finance Sentinel any further, having lost over £500,000 before taxation last year. The Sentinel company, he said, had been brought to a state of perfection

Mr. W. T. Gill, a director of Rolls-Royce, said that the company would continue with Sentinel's present lines of production—locomotives, diesel vehicles, machine tools, and specialized vehicles for the Ministry of Supply—using any surplus manufacturing capacity to meet the demands of its expanding business. Mr. J. T. Rymer would continue as managing director of Sentinel.

Mr. T. H. EDWARDS has been appointed chief buyer in charge of the purchasing department at the Desford works of the Caterpillar Tractor Company, Limited. Mr. R. H. RICHARDSON will serve as buyer in the position vacated by Mr. Edwards.

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Grinding wheels must work at a definite maintained speed for maximum efficiency. Because of this the constant speed characteristic of HICYCLE heavy duty grinders enables operators to remove more metal at the fastest possible rate with the lowest possible wheel costs . . . all with reduced operator fatigue.

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Current Prices of Iron, Steel, and Non-ferrous Metals

(Delivered unless otherwise stated)

September 12, 1956

PIG-IRON

Foundry Iron.—No. 3 IRON, CLASS 2:—Middlesbrough, £17 11s. 0d.; Birmingham, £17 3s. 3d.

Low-phosphorus Iron.—Over 0.10 to 0.75 per cent. P, £20 8s. 0d., delivered Birmingham. Staffordshire blast-furnace low-phosphorus foundry iron (0.10 to 0.50 per cent. P, up to 3 per cent. Si), d/d within 60 miles of Stafford, £20 12s. 3d.

Scotch Iron.—No. 3 foundry, £21 14s. 6d., d/d Grangemouth.

Cylinder and Refined Irons.—North Zone, £23 16s. 6d.; South Zone, £23 19s. 0d.

Refined Malleable.—P, 0.10 per cent. max.—North Zone, £25 4s. 0d.; South Zone, £25 6s. 6d.

Hematite.—Si up to 2 per cent., S. & P. over 0.03 to 0.05 per cent. :—N.-E. of England (local iron), £21 7s. 6d.; Scotland (Scotch iron), Zone S. 1, £21 14s. 0d.; Sheffield, £22 14s. 6d.; Birmingham, £23 2s. 0d.; Wales (Welsh iron), £21 7s. 6d.

Basic Pig-iron.—£18 3s. 0d. all districts.

FERRO-ALLOYS

(Per ton unless otherwise stated, delivered)

Ferro-silicon (6-ton lots and over).—45 per cent. Si, £48 0s. 0d. to £50 5s. 0d., scale 16s. 0d. to 17s. 6d. per unit; 75 per cent. Si, £70 0s. 0d. to £73 2s. 6d., scale 16s. 0d. to 17s. 6d. per unit.

Ferro-vanadium.—50/60 per cent., 27s. 6d. per lb. of V.

Ferro-molybdenum.—65/75 per cent., carbon-free, 11s. 6d. per lb. of Mo.

Ferro-titanium.—20/25 per cent., carbon-free, £250 0s. 0d.; 38/40 per cent., £299 0s. 0d.

Ferro-tungsten.—80/85 per cent., 17s. 0d. per lb. of W.

Tungsten Metal Powder.—98/99 per cent., 20s. 0d. per lb. of W.

Ferro-chrome (6-10 ton lots).—4/6 per cent.C, £93 10s.0d. to £95 0s. 0d., basis 60 per cent. Cr, scale 29s. 9d. to 32s. 0d. per unit; over 6 per cent. C, £92 10s. 0d. to £93 0s. 0d., basis 60 per cent. Cr, scale 29s. 9d. to 32s. 0d. per unit; 2 per cent. C,* 2s. 1d. per lb. Cr; 1 per cent. C,* 2s. 1½d. per lb. Cr; 0.15 per cent. C,* 2s. 2½d. per lb. Cr; 0.10 per cent. C,* 2s. 2¾d. per lb. Cr; 0.06 per cent. C,* 2s. 3d. per lb. Cr.

Metallic Chromium.—98/99 per cent., 7s. 0d. to 7s. 6d. per lb.

Metallic Manganese.—93/95 per cent., carbon-free, £249 0s. 0d.; 96/98 per cent., £259 0s. 0d. to £265 0s. 0d.

Ferro-columbium.—65/75 per cent., Nb + Ta, 22s. 6d. to 23s. 6d. per lb., Nb + Ta.

Ferro-manganese (home).—78 per cent., £66 0s. 0d.

SEMI-FINISHED STEEL

Re-rolling Billets, Blooms, and Slabs.—BASIC: Soft, u.t., £28 19s. 0d.; tested, 0.08 to 0.25 per cent. C, £29 19s. 0d.; hard (0.41 to 0.60 per cent. C), £31 0s. 6d.; silico-manganese, £39 10s. 0d.; free-cutting, £33 3s. 0d. SIEMENS MARTIN ACID: Up to 0.25 per cent. C, £36 14s. 6d., silico-manganese, £39 17s. 6d.

Billets, Blooms, and Slabs for Forging and Stamping.—Basic, soft, up to 0.25 per cent. C, £34 13s. 6d.; basic, hard, over 0.41 up to 0.60 per cent., C, £35 16s. 0d.; acid, up to 0.25 per cent. C, £38 17s. 6d.

FINISHED STEEL

Heavy Plates and Sections.—Ship plates (N.-E. Coast), £35 7s. 0d.; boiler plates (N.-E. Coast), £37 17s. 0d.; floor plates (N.-E. Coast), £36 16s. 0d.; sectional material, N.-E. Coast, £33 16s. 6d.

Small Bars, Sheets, etc.—Rounds and squares, under 3 in., untested (4-ton lots), £36 3s. 0d.; flats, 5 in. wide and under (4-ton lots), £36 3s. 0d.; hoop and strip, £36 12s. 6d.; uncoated strip mill coils, hot rolled, under 3mm. to 12g., £38 16s. 0d.; black sheets (hand mill), 17/20 g., £50 4s. 6d.; galvanized corrugated sheets, 24 g., £62 2s. 0d.

Alloy Steel Bars.—1 in. dia. and up: Nickel, £61 13s. 9d.; nickel-chrome, £85 10s. 6d.; nickel-chrome-molybdenum, £96 16s. 6d.

NON-FERROUS METALS

Copper.—Cash, £307 0s. 0d. to £307 10s. 0d.; three months, £306 0s. 0d. to £306 10s. 0d.; settlement, £309 10s. 0d.

Copper Tubes, etc.—Solid-drawn tubes, 2s. 11½d. per lb.; rods, 344s. 9d. per cwt. basis; 20 s.w.g., 378s. 0d. per cwt.

Tin.—Cash, £793 0s. 0d. to £794 0s. 0d.; three months, £785 0s. 0d. to £786 0s. 0d.; settlement, £794 0s. 0d.

Lead (Refined Pig).—First half September, £118 10s. 0d. to £118 15s. 0d.; first half December, £116 0s. 0d. to £116 5s. 0d.

Zinc.—First half September, £96 5s. 0d. to £96 10s. 0d.; first half December, £94 5s. 0d. to £94 10s. 0d.

Zinc Sheets, etc.—Sheets, 15 g. and thicker, all English destinations, £127 15s. 0d.; rolled zinc (boiler plates), all English destinations, £125 10s. 0d.; zinc oxide (Red Seal), d/d buyers' premises, £110.

Brass Tubes, etc.—Solid-drawn tubes, 2s. 5½d. per lb.; rods, drawn, 3s. 3¾d.; sheets to 10 w.g., 320s. 3d. per cwt.; wire, 3s. 1½d.; rolled metal, 305s. 3d. per cwt.

Brass (Brazing).—BS1400, B3 (65/35), £200; B6 (85/15), —; BS249, —.

Brass (High Tensile).—BS1400, HTB1 (30 tons), £250; HTB2 (38 tons), —; HTB3 (48 tons), £265.

Gunmetal.—BS1400, LG2 (85/5/5/5), £273; LG3 (86/7/5/2), £283; G1 (88/10/2/½), £332; (88/10/2/1), £326.

Phosphor Bronze.—BS1400, PB1 (AID released), £340 per ton.

Phosphor Bronze Strip, etc.—Strip, 441s. 0d. per cwt.; sheets to 10 w.g., 465s. 6d. per cwt.; wire, 4s. 6¾d. per lb.; rods, 3s. 11d.; tubes, 3s. 9½d.; chill cast bars: solids 3s. 10¾d., cored 3s. 11¾d. (CHARLES CLIFFORD, LIMITED).

Nickel Silver, etc.—Rolled metal, 3 in. to 9 in. wide × 0.056, 4s. 2d. per lb.; round wire, 10g. in coils (10 per cent.), 4s. 6¾d.; special quality turning rod, 10 per cent., ½ in. dia., in straight lengths, 4s. 5¾d. All prices are net.

Other Metals.—Magnesium, ingots, 2s. 4d. per lb. Antimony, English, 99 per cent., £210 0s. 0d. Quicksilver, ex-warehouse, £83 10s. 0d. Nickel, £519 0s. 0d. Aluminium ingots, £198 10s. 0d.; aluminium bronze (BS1400), AB1, £311; AB2, £311. Solder, brazing, BS1945, type S (50/50), 3s. 1d. per lb., type 9 (54/46), 3s. 4½d. per lb.

* Average 68–70 per cent.

F. & M.

REGD. TRADE MARK

SILICON AND MANGANESE BRIQUETTES

FOR SOFTENING AND REFINING CAST IRON

F. & M. SILICON BRIQUETTE

F. & M. MANGANESE BRIQUETTE

For the past fourteen years, F. & M. Supplies Ltd. have provided in their Ferro Silicon Briquettes a practical, convenient and economical means of increasing the amount of silicon in a cast iron. The necessary number of Briquettes is added to the charge in the cupola and all the silicon contained in the briquettes passes into the molten metal with only a negligible loss because the alloy is protected during its progress through the oxidizing zone. An important function of F. & M. Silicon Briquettes is the production of dense iron castings.

Many cupola charges require the addition of manganese to combine with the sulphur and form the comparatively innocuous manganese sulphide. Manganese is also needed in the production of cast iron having a medium tensile strength and is essential when a steel scrap is incorporated in the charge.

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SILICOMANGANESE AND FERRO CHROMIUM BRIQUETTES

Personal

Mr. W. B. LAING, M.I.E.E., has been appointed managing director of Bruce Peebles & Company, Limited, Edinburgh.

Mr. RAY WILSON has been appointed divisional managing director of the British Electro Metallurgical Company, Sheffield.

Mr. W. L. WILSON has retired from the board of directors of the Skefko Ball Bearing Company, Limited, on the grounds of ill-health.

Dr. FRANK WALLACE, lecturer in mechanical engineering at Birmingham University, has been appointed research engineer to companies in the Associated British Engineering group.

Mr. W. M. THOMPSON, sales director of Monsanto Chemicals, Limited, has been appointed a director of Monsanto Plastics, Limited, a wholly owned subsidiary of Monsanto Chemicals.

Mr. JAMES BOWIE, assistant blast-furnace manager of the Consett Iron Company, Limited, has been appointed blast-furnace manager of the Cargo Fleet Iron Company, Limited, Middlesbrough.

The A.E.I. Lamp & Lighting Company, Limited, has appointed Mr. JOHN B. HENDERSON to the new position of regional publicity assistant for Scotland and Northern Ireland. He was previously publicity officer for Scottish Cables, Limited, Renfrew.

Colonel C. R. HODGSON, a director of C. & J. Hampton Limited, Record Tool Works, Sheffield, and Rotherham Forge and Rolling Mills Company, Limited, who is president of the Sheffield Chamber of Commerce and Manufacturers, is making plans with his fellow officials to celebrate the centenary of the Sheffield Chamber in March next year.

Mr. J. F. DOUGLAS, a director and manager of the shiprepair department of Cammell Laird & Company (Shipbuilders & Engineers), Limited, Birkenhead, has been appointed general manager of the company, being succeeded as manager of the shiprepair department by Mr. A. DUNCAN, his former assistant. Mr. Duncan's former duties are to be undertaken by Mr. L. DEAKIN.

CARBON DIOXIDE COMPANY (a division of the Distillers Company, Limited) announces the appointment of Mr. S. C. STEWART as director in charge of the division with effect from September 1. Mr. Stewart, who has been a division director of the company for some years, is general manager of the industrial alcohol division, and a division director of the British industrial solvents division, of D.C.L.

Chairman of the committee set up to advise Sir David Eccles, Minister of Education, urgently on the recruitment and training of teachers for technical colleges is to be Prof. WILLIS JACKSON, F.R.S., who is director of research and education for the Metropolitan-Vickers Electrical Company, Limited. Prof. Jackson is a member of the National Advisory Council for Education for Industry and Commerce.

Mr. E. W. MARVILL has been appointed general manager of the manufacturing division of F. Perkins, Limited, diesel engine manufacturers, of Peterborough, and will be in charge of the production, inspection, plant maintenance, and electric power and development departments. Mr. R. ALBON, who has been appointed general manager of the personnel division, will look after the company's medical service and the welfare of employees paid by the hour.

Prof. A. S. T. THOMSON, head of the department of civil, mechanical and chemical engineering at the Royal Technical College, Glasgow, is one of a group of nine British engineers who are to visit the USSR this month to study engineering education and training. The group were nominated by the Joint Committee of the Institutions of Civil, Mechanical, and Electrical Engineers, and the visit will take place under the auspices of the Soviet Relations Committee of the British Council.

Sir PETER ROBERTS, Bt., M.P., who is to be the next Master Cutler, is chairman of Newton Chambers and Company, Limited, Thorncliffe, near Sheffield, and also chairman of Wellman Smith Owen Engineering Corporation, Limited, Darlaston, Staffs. His family has been associated with industry in the Sheffield district for more than 300 years and he is a direct descendant of Robert Sorsby, first Master of the Company of Cutlers in Hallamshire created by special Act of Parliament in 1624. It was in December, 1954, that he became chairman of Newton Chambers in succession to his father, the late Sir Samuel Roberts, Bt. Sir Peter is also a director of the Sheffield firm of Drabble & Sanderson which is associated with Spear & Jackson, Limited, who are engaged in an expanding business manufacturing tools, saws, and similar goods.

Mr. L. DRUCQUER, who has been appointed a director of the British Thomson-Houston Company, Limited, with special responsibility for home sales, joined BTH in 1920 to gain practical experience in the testing department at Rugby after gaining his engineering diploma at the London Polytechnic. Subsequently he had two years on the outside construction staff before taking up an appointment in the switchgear contracts department at Willesden in 1925. Mr. Drucquer became assistant manager of that department in 1939 and manager in January, 1945. Since October, 1950, he has been manager, home sales. An active member of the Institution of Electrical Engineers for many years, he is a member of the IEE Council and was chairman of the Supply Section for the 1955-56 session. Mr. Drucquer is also a director of the Switchgear Testing Company, Limited, Manchester.

Obituary

Mr. LIONEL CLARENCE MEARS, a director of E. MacKinnon & Company, Limited, general brassfounders, of Birmingham, has died at the age of 66. Mr. Mears, who had been in the brassfounding trade since he was 13, had served the company for 20 years.

Sir BEDFORD DORMAN, who died on September 5, was the second son of Sir Arthur Dorman, the founder of Dorman, Long & Company, Limited, Middlesbrough. Sir Bedford was 77. He succeeded to the baronetcy on the death of his father in 1931, his elder brother having died without issue in 1929. Sir Bedford was called to the Bar by the Inner Temple in 1901.

Sir RALPH WEDGWOOD, chairman of the Railway Executive Committee from 1939 to 1941, died on September 5 at the age of 82. A member of the famous family of potters, Sir Ralph entered the service of the North Eastern Railway in 1896 and held many important positions during his long career in the railway service. On the formation of the London and North Eastern Railway in 1923 he was appointed its chief general manager, an appointment he retained until 1939. Sir Ralph was president of the Confederation of Employers' Organizations in 1929-30.

The Muir-Hill LH-1 is a compact, highly manoeuvrable diesel-powered loader with the unique advantage of bringing bulk material handling in confined areas out of the hand shovel into the mobile power loading class.

6ft. 6in. working ceiling, 7ft. 6in. turning radius, 4ft. 3in. width—consider these dimensions in relation to those awkward places where you have never before been able to employ any form of mechanisation—and then ask us to send you further details on the LH-1.

It does not matter what material you are handling, the LH-1 has the right bucket for the job, with a range of 14.5, 10.5 and 6.5 cu. ft. capacities, a special ore bucket and a fork lift attachment of 1,000 lbs. rated capacity with evenly distributed loads.

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Imports and Exports of Iron and Steel in July

The following tables, based on Board of Trade returns, gives figures of imports and exports of iron and steel in July. Totals for the first seven months of this year and last are also included.

Total Exports of Iron and Steel

Destination.	Month ended July 31.	Seven months ended July 31.	
	1956.	1955.	1956.
	Tons.	Tons.	Tons.
Channel Islands	361	3,554	3,022
Cyprus	493	2,793	4,053
Sierra Leone	1,279	5,117	4,757
Gold Coast	1,033	13,755	14,786
Nigeria	4,098	27,991	34,559
Union of South Africa	6,218	40,641	44,136
Rhodesia and Nyasaland	7,505	38,578	51,869
Tanganyika	3,618	8,724	13,436
Kenya	3,534	28,573	30,364
Uganda	162	2,454	3,176
Anglo-Egyptian Sudan	637	9,355	8,717
Mauritius	285	1,364	1,835
Aden	305	4,939	3,213
Bahrain, Qatar, and Trucial States	904	7,060	5,857
Kuwait	404	1,808	3,053
India	26,398	65,452	179,902
Pakistan	1,612	24,520	27,616
Singapore	1,943	20,438	17,714
Malaya	3,296	11,319	22,578
Ceylon	3,354	9,580	20,620
British North Borneo	395	2,650	3,859
Hongkong	3,935	26,673	35,997
Australia	14,574	227,633	127,169
New Zealand	14,645	151,973	114,490
Canada	28,003	62,755	176,536
Jamaica	1,771	7,003	14,571
Trinidad	2,563	27,539	22,952
British Guiana	509	3,803	3,059
Other Commonwealth countries	2,241	12,951	15,819
Eire	5,279	33,744	41,560
Finland	5,488	42,197	32,012
Sweden	6,245	79,069	69,361
Norway	6,635	72,235	50,101
Denmark	9,300	48,232	45,589
Western Germany	560	4,798	6,556
Netherlands	8,041	56,196	51,766
Belgium	890	13,133	21,405
France	538	3,398	4,854
Switzerland	882	8,982	8,146
Portugal	1,043	7,892	5,894
Spain	1,642	46,103	19,211
Italy	825	16,833	11,172
Austria	302	1,713	2,845
Yugoslavia	41	9,985	4,580
Greece	317	6,017	3,185
Turkey	77	6,381	2,934
Netherlands Antilles	431	6,622	5,736
Portuguese E. Africa	456	1,097	1,979
Lebanon	91	9,140	4,748
Egypt	3,327	14,801	30,034
Israel	588	5,845	5,838
Saudi Arabia	1,504	4,455	8,620
Iraq	2,301	25,206	20,372
Iran	708	28,436	41,087
Burma	1,024	7,669	4,489
Thailand	737	2,992	4,466
Indonesia	1,277	2,337	7,146
Philippine Republic	297	3,056	4,066
USA	3,485	26,233	27,361
Cuba	843	2,779	5,485
Colombia	581	3,673	2,024
Venezuela	4,537	31,983	40,552
Ecuador	282	1,381	1,828
Peru	1,096	4,925	10,079
Chile	103	599	605
Uruguay	309	4,803	3,198
Argentina	5,428	36,786	31,707
Other foreign countries	8,941	20,902	29,578
TOTAL	222,526	1,553,623	1,681,944

FOUR HUNDRED EMPLOYEES of Qualcast, Limited, iron-founders, Derby, who have been on short time, resumed a five-day week on Monday, September 3, following an increase in orders from the motor-car industry.

Total Imports of Iron and Steel

From	Month ended July 31.	Seven months ended July 31.	
	1956.	1955.	1956.
	Tons.	Tons.	Tons.
Rhodesia and Nyasaland	353	2,141	1,856
Australia	15	59	121
Canada	5,203	65,942	34,095
Other Commonwealth countries and Eire	986	15,405	4,307
Soviet Union	20,798	109,811	179,959
Sweden	4,139	17,426	28,188
Norway	8,600	42,528	58,723
Western Germany	15,294	19,871	135,974
Netherlands	5,365	89,004	62,706
Belgium	30,641	69,852	244,323
Luxembourg	5,678	18,931	42,290
France	16,917	107,191	170,803
Italy	1,152	769	7,133
Austria	13,675	70,037	95,465
Japan	1,573	17,277	11,125
USA	25,464	437,848	338,848
Other foreign countries	4,980	6,865	48,348
TOTAL	160,761	1,090,957	1,464,264
Iron and steel scrap and waste, fit only for the recovery of metal	122,558	732,722	622,595

Exports of Iron and Steel, by Products

Product.	Month ended July 31.	Seven months ended July 31.	
	1956.	1955.	1956.
	Tons.	Tons.	Tons.
Pig-iron	9,749	33,029	70,522
Ferro-colombium (niobium)	15	44	105
Ferro-tungsten	76	282	646
Other ferro-alloys	272	1,703	2,419
Ingots, blooms, billets, slabs, sheets, and tinplate bars	74	3,301	1,142
Iron bars, rods, angles, shapes, and sections	237	2,118	1,444
Steel bars, rods, angles, sections, and shapes	39,482	243,480	274,204
Iron plates and sheets	—	99	93
Universal plates	170	6,103	2,818
Steel plates, ⅛ in. and under ¼ in.	302	13,051	5,739
Do., ¼ in. and over	16,492	160,532	138,394
Blacksheets and black plate	26,829	127,207	135,802
Hoop and strip	6,041	62,799	53,061
Tinplate	21,480	180,615	173,395
Decorated tinplate	354	2,259	4,131
Galvanized sheets	15,490	95,546	90,236
Other (incl. tinned sheets, terne-plate, and ternesheets)	1,210	8,974	8,799
Railway and tramway construction material	20,989	145,800	176,436
Wire rods	3,321	17,091	22,328
Wire	6,337	56,680	56,935
Tubes, pipes and fittings	62,869	384,851	458,471
Iron castings	188	4,890	1,263
Steel castings	189	1,173	1,123
Forgings	360	1,996	2,438
TOTAL	222,526	1,553,623	1,681,944

A city service double-deck bus with automatic control gear, which relieves the driver of the need of changing gear and ensures that the vehicle is driven in the gear most suited to the road conditions, will be shown by Leyland Motors Limited, in the demonstration park at the Commercial Motor Show. (Earls Court, London, September 21 to 29.)